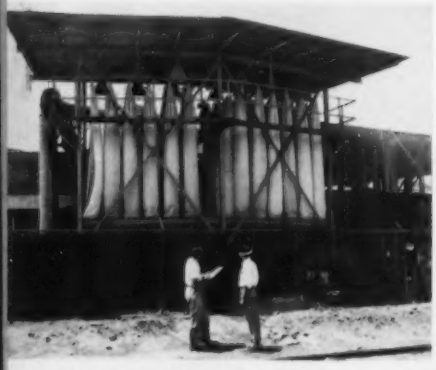
ELECTRICAL WEST

April 1954
25 Cents

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U.S.



Needed—A 1¾ Billion-Hp Fan... 78

Speed Control Was the Answer... 91

Promotions Bursting Out All Over..104

Take the Cafeteria to the Workers..... 82

Northwest Can't Temporize with Its Power Problem..... 75

Brass Made the All-Electric Way..... 86

Resistance Heating Cut Labor Cost 50%..... 88

New Type Enamel Is Electrically Baked..... 89

Glass Quality Up, Costs Down..... 92

Annual Industrial Issue

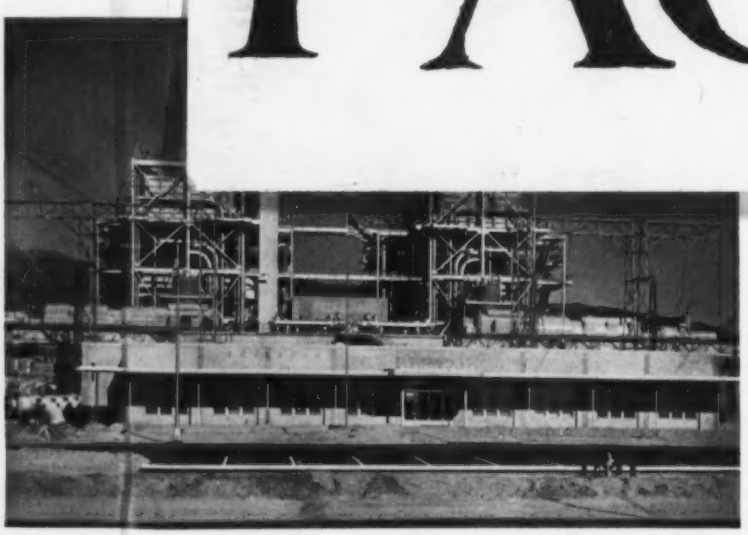
On the line: More Power for Edison customers

Edison SOUTHE

ETIWANDA

generatin

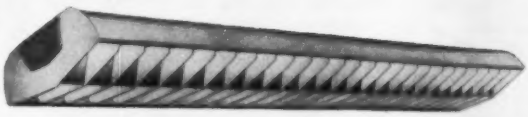
dedicated April 14, 1



WA

PAG

COLLEGIATE



168 TROFFER

INDUSTRO-LUX

SCHOOLS AND OFFICE BUILDINGS

FACTORIES

HOW GOOD LIGHTING PAYS

AVY

iES

DIVIDENDS

THESE ARE FACTS!

For parking lots, service stations and used car lots let us be the interpreter through this maze of engineering data. PS-52 1000 watt lamps used in a porcelain enameled reflector such as the "MASTER flood yield 17 beam lumens per watt. Far more than most other types of lighting. For the same energy cost you receive 70% MORE LIGHT with a SMOOT-HOLMAN "MASTER" floodlight than with other types. Less lamp changes required by using this "MASTER" flood rather than smaller wattages. For less than ½ the lamp cost you receive the same amount of light. THESE ARE COLD FACTS... ARE YOU GETTING LUMENS OR LEMONS? You can apply similar advantages to offices, schools and factories with SMOOT-HOLMAN QUALITY LIGHTING EQUIPMENT... THERE IS A DIFFERENCE.

FLOODLIGHT AREAS

STANDARD DOME

CLASSROOMS

EDUCATOR

SIGN OF QUALITY

SMOOT-HOLMAN

INGLEWOOD CALIFORNIA

SALES OFFICES IN MOST PRINCIPAL CITIES

OFFICE AND WAREHOUSE SAN FRANCISCO

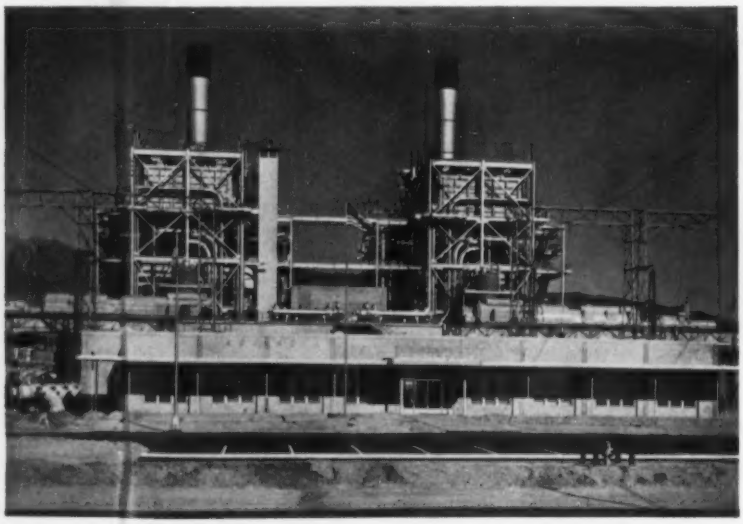
On the line: More Power for Edison customers

SOUTHERN CALIFORNIA EDISON COMPANY

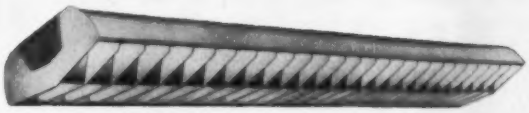
ETIWANDA STEAM STATION

generating capacity: 265,000 kilowatts

dedicated April 14, 1954



COLLEGIATE



168 TROFFER

INDUSTRO-LUX

SCHOOLS AND OFFICE BUILDINGS

FACTORIES

HOW GOOD LIGHTING PAYS

DIVIDENDS

THESE ARE FACTS!

For parking lots, service stations and used car lots let us be the interpreter through this maze of engineering data. PS-52 1000 watt lamps used in a porcelain enameled reflector such as the "MASTER flood yield 17 beam lumens per watt. Far more than most other types of lighting. For the same energy cost you receive 70% MORE LIGHT with a SMOOT-HOLMAN "MASTER" floodlight than with other types. Less lamp changes required by using this "MASTER" flood rather than smaller wattages. For less than ½ the lamp cost you receive the same amount of light. THESE ARE COLD FACTS...ARE YOU GETTING LUMENS OR LEMONS? You can apply similar advantages to offices, schools and factories with SMOOT-HOLMAN QUALITY LIGHTING EQUIPMENT...THERE IS A DIFFERENCE.

FLOODLIGHT AREAS

STANDARD DOME

CLASSROOMS

EDUCATOR

SIGN OF QUALITY

SMOOT-HOLMAN

INGLEWOOD CALIFORNIA

SALES OFFICES IN MOST PRINCIPAL CITIES

OFFICE AND WAREHOUSE SAN FRANCISCO

APRIL
1954

SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U. S.
The all-industry magazine of progress, established 1887, and incorporating the "Electrical Journal," "Journal of Electricity, Power and Gas" and "Journal of Electricity." Contents copyright. Sixty-sixth year of publication

VOL. 112
NO. 4

ELECTRICAL WEST

George C. Tenney, Editor
W. A. Cyr, Associate Editor
Peggy Boyer, Associate Editor
Walter C. Heston, Engineering Editor
John Coetz, Typography

Next Month

Leading off will be a timely article by A. H. Gudie on "Cut Price and Go Broke." It will deal with the vicious price cutting practice going on in the distribution channels.

In sales there will be a sermon for dealers by a prominent banker on credit as it affects sales.

A problem facing utilities is the question of whether to serve residential air conditioning loads three phase or single phase. Early decisions on policy and rates must be made. An article based on the experience of a Western utility should prove of great value to those confronted with the problem.

Another utility contributes an economic study to determine the value of voltage regulation along the lines suggested in the letter to distribution engineers on p. 79 of the November 1953 issue. They have come up with some impressive facts.

Southern California now has available to it a mobile test transformer that will supply 200,000 amp. How this was made possible through cooperative undertaking will be told.

Association meeting reports will include the business development and administrative services meetings of PCEA, the E and O meeting of the Northwest Electric Light & Power Assn. and the Northwest Public Power Assn.

CONTENTS

Northwest Can't Temporize with Its Power Problem 75
Needed—A 1¾ Billion-Hp Fan to Blow Away Smog by Martin A. Brower 78
Take the Cafeteria to the Workers by Ernest G. Alberts . . 82
Brass Made the All-Electric Way 86
Resistance Heating Cut Labor Cost 50% by Paul Henrichs 88
New Type Enamel Is Electrically Baked by Louis E. Anderson 89
Infrared Cures Plastic Embedments 90
Four Times Faster at Half the Cost 90
Electronic Speed Control Was the Answer by Frank M. Reis 91
No More Headaches with New Sewing Light 91
Glass Quality Up, Costs Down 92

SALES

Touchy Questions Were Tackled 101
IEA Seeks Out Sales Opportunities 102
Sales Promotions Bursting Out All Over 104

DEPARTMENTS

Associations	108	New Products	46
Bulletins	70	News	124
Contractors' News Letter	93	NWEL&PA	119
Editorials	106	PCEA	108
Electra's Husband	72	Sales Guide News Letter	97
Letters to the Editor	32	Advertising Index	156

ADVERTISING REPRESENTATIVES
Chicago (11) . . . . . Michael I. O'Connell, 520 N. Michigan Ave.
Los Angeles (17) . . . . . Carl Dysinger, 1111 Wilshire Blvd., MA 6-4323
New York (36) . . . . . Walter Klein, 330 W. 42nd St.
San Francisco (4) . . . . . Tom Carmody, Dick Alcorn, 68 Post St., DO 2-4600
Offices: Atlanta, Boston, Cleveland, Dallas, Detroit, Philadelphia, Pittsburgh, St. Louis

THE ELECTRICAL WEST EDITORIAL ADVISORY BOARD — UTILITIES: N. R. Sutherland, Vice-President and General Manager, Pacific Gas and Electric Company, San Francisco; J. A. Hale, Vice-President, Utah Power & Light Company, Salt Lake City; Glenn L. Jackson, Vice-President, the California Oregon Power Company, Medford; Kinsey M. Robinson, President, Washington Water Power Company, Spokane; J. H. Polhemus, President and General Manager, Portland General Electric Company; W. C. Mullendore, President, Southern California Edison Co. Ltd., Los Angeles. MANUFACTURERS: J. H. Pengilly, Executive Vice-President, Square D Company, Los Angeles; R. A. Neal, Vice-President, Westinghouse Electric Corporation, San Francisco; Ray Turnbull, Vice-President, General Electric Company, San Francisco. WHOLESALERS: A. H. Meyer, Leo J. Meyberg Co., San Francisco and Los Angeles; Harry C. Gerster, Vice-President, General Electric Supply Co., Los Angeles. CONTRACTORS: Teo L. Rosenberg, T. L. Rosenberg Co., Oakland; Don Larson, manager, Rocky Mt. Chapter, NECA, Denver. DEALERS: K. L. Hampton, manager, Valley Electrical Supply Company, Fresno; J. C. Chamberlain, Sec.-Mgr., Bureau of Home Appliances of San Diego County, San Diego, California.

ELECTRICAL WEST (with which is consolidated The Journal of Electricity). APRIL 1954. Vol. 112, No. 4. Published monthly by McGraw-Hill Company of California. **Publication office, 1111 Wilshire Blvd., Los Angeles 17, California. Executive, Editorial and Advertising Offices: 68 Post St., San Francisco 4, Calif.** James H. McGraw (1860-1948), Founder; Donald C. McGraw, Chairman of the Board; George C. Tenney, President; John W. Otterson, Vice-President; B. M. Boccali, Secretary and Treasurer. **Subscriptions: Address correspondence to Electrical West—Subscription Service, 68 Post St., San Francisco 4, Calif. Allow 30 days for change of address. Please indicate position and company connection on all subscription orders.** Single copies 25c. Subscription rates—U. S. possessions and Latin American Republics: $2 a year; $3 for two years; $4 for three years. Canada $2.50 a year; $5 for three years. All other countries $3 a year; $5 for two years; $6 for three years. Entered as second class matter April 17, 1947, at the post office at Los Angeles, Calif., under the act of March 3, 1879. Printed in U.S.A. Copyright 1954 by McGraw-Hill Company of California. All rights reserved.

Wide Acceptance Shows Need For L-M Heavy Duty Cutouts

L-M's "PHD" (Porcelain Heavy Duty) Fuse Cutouts have met with wide acceptance all over the country. This shows the need that exists for a complete line of cutouts designed and built especially for service on high capacity distribution feeders.

5 kv

L-M's "PHD" Cutouts, introduced more than two years ago, comprised the first complete line of heavy duty cutouts with realistic and usable interrupting capacities. Extensive testing was conducted for two years before they were introduced. Special attention was paid to design details, such as cementing, contact alignment, and door and cartridge positioning, which govern successful cutout operation. These cutouts successfully clear both high and low amperage faults—safely, without danger of exploding porcelain—and assure safety for personnel and equipment, and continuity of service.

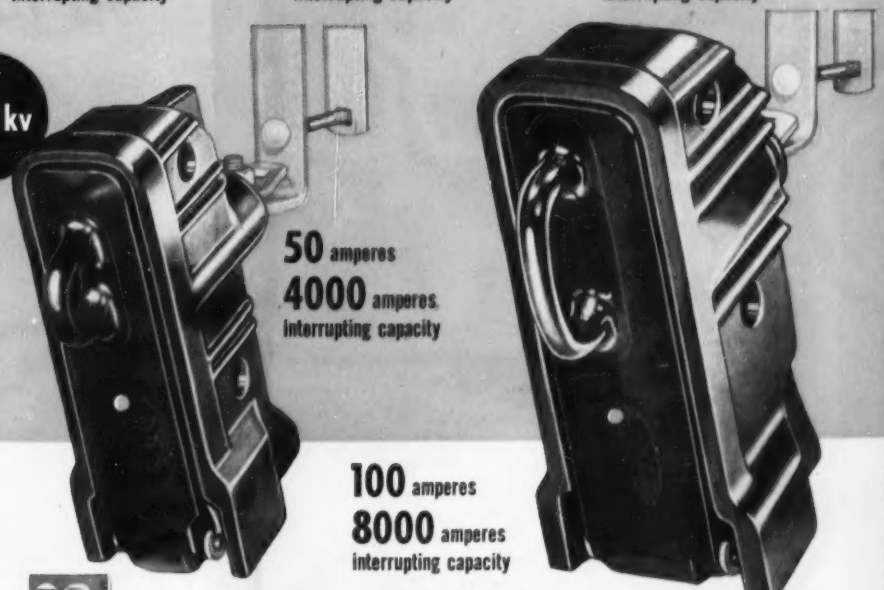
"PHD" is a Line Material Company Trademark

50 amperes
8000 amperes
interrupting capacity

100 amperes
14,000 amperes
interrupting capacity

200 amperes
20,000 amperes
interrupting capacity

7.5 kv



50 amperes
4000 amperes
interrupting capacity

100 amperes
8000 amperes
interrupting capacity

Here's Complete "PHD" Line

5 kv Rating	Interrupting Capacity rms amperes	
	2.5 kv*	5 kv**
50 amps.	8,000	5,000
100 amps.	14,000	10,000
200 amps.	20,000	15,000
7.5 kv	Interrupting Capacity	
50 amps.	4,000 amperes	
100 amps.	8,000 amperes	

*or line-to-neutral on 4160 or 4330 volts Gr.Y. **or line-to-neutral on 8330 volts Gr.Y.

150

For information ask the L-M Field Engineer for Bulletins, or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

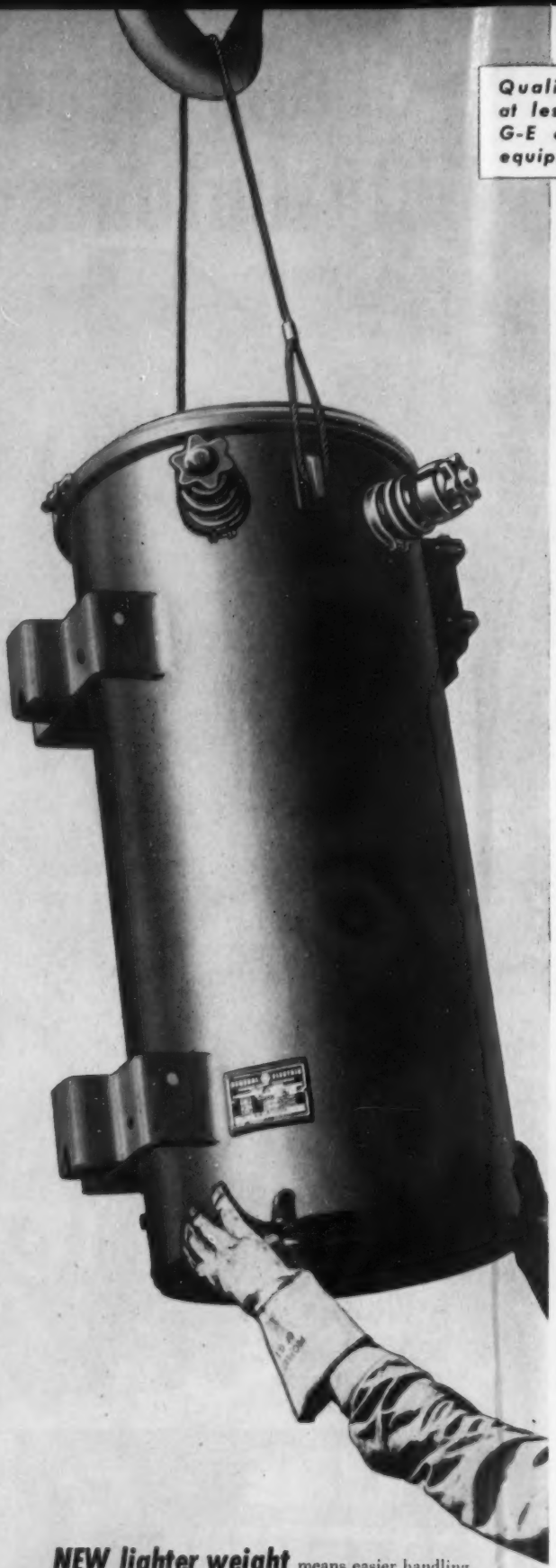
LINE MATERIAL

fuse cutouts and fuse links

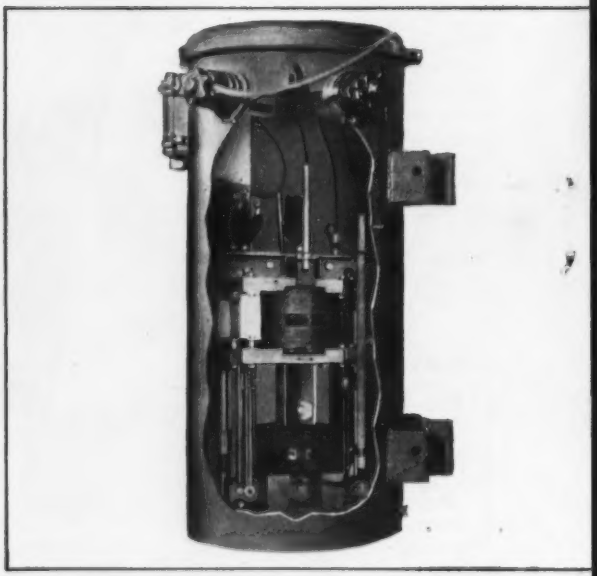
Quality lighting at less cost with G-E engineered equipment.

ALL NEW G-E Constant-current TRANSFORMER for Street-lighting Systems

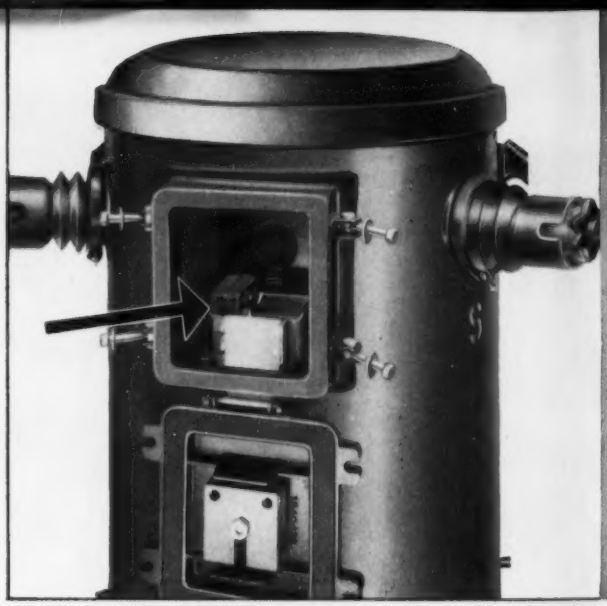
up to 33% lighter



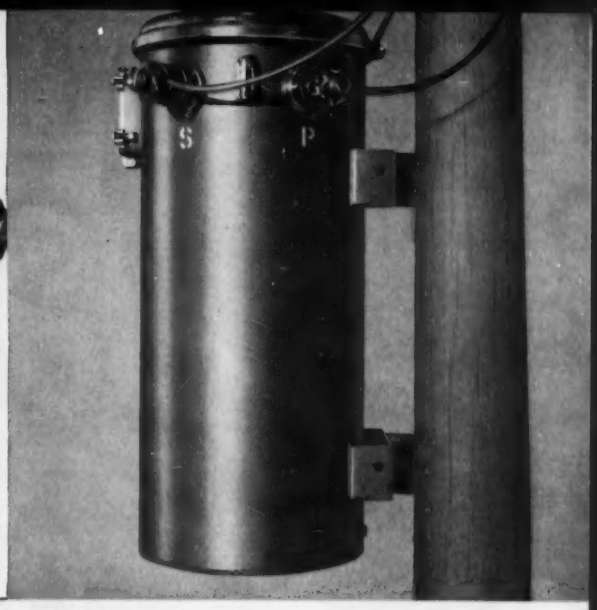
NEW lighter weight means easier handling. RO2 transformer, including oil, is 20% and 33% lighter in the 10-kw and 30-kw sizes respectively.



NEW faster response to load changes from radically new design which eliminates counter balance, introduces parallel straight-line motion, cuts down friction points.

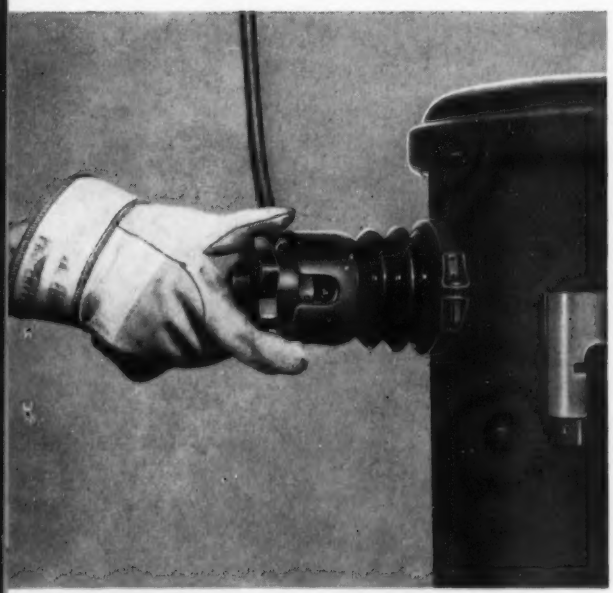


NEW easy adjustment is accomplished from the outside through convenient access door located above the oil level. Transformer cover need not be removed.



NEW easy mounting cuts installation time. Special slotted mounting bracket allows direct-pole mounting of models up to and including the 20-kw size.

. . . and far easier to install and maintain



NEW simplified connections, quickly, without tools, by inserting the cable from either direction into the bushings and tightening the insulated handwheel.

G.E.'s new CC transformer for street lighting represents the most sweeping design advance in the industry in 50 years.

LESS FRICTION—It uses the magnetic suspension principle to completely support its moving coil. Thus, the only points of friction in the entire assembly are the two sleeve ball bearings which direct vertical movement of the moving coil.

LIGHTER WEIGHT—The new CC transformer is lighter and more compact, permitting pole mounting of larger ratings than was possible before. Grain oriented silicon strip steel in the core and aluminum wire in the moving coil conserve space and weight.

GREATER CONVENIENCE—Easy installation and servicing are assured by the simple mounting bracket, the cable bushings with their insulated handwheels. The access door on the side of the tank permits adjustments without removing the cover and reaching below the oil level.

VERSATILE—Designed to supply constant current for series street-lighting circuits, this new G-E CC transformer will operate efficiently with any type of lamp load.

MORE INFORMATION—Is available from your nearest G-E Apparatus Sales Office or authorized G-E street-lighting agent. Or write for Bulletin GEA-5975, Section 452-137, General Electric Company, Schenectady 5, N. Y.

You can put your confidence in—

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

THIS COMPLETE LINE MEETS EVERY NEED FOR PUSHBUTTONS

DESIGN LEADERSHIP

STANDARD DUTY

HEAVY DUTY

● Name your pushbutton requirement—there's a Square D unit to do the job, exactly. Three complete lines . . . standard duty, heavy duty, and oil-tight heavy duty . . . each providing a wide range of operators, stations, and circuit combinations.

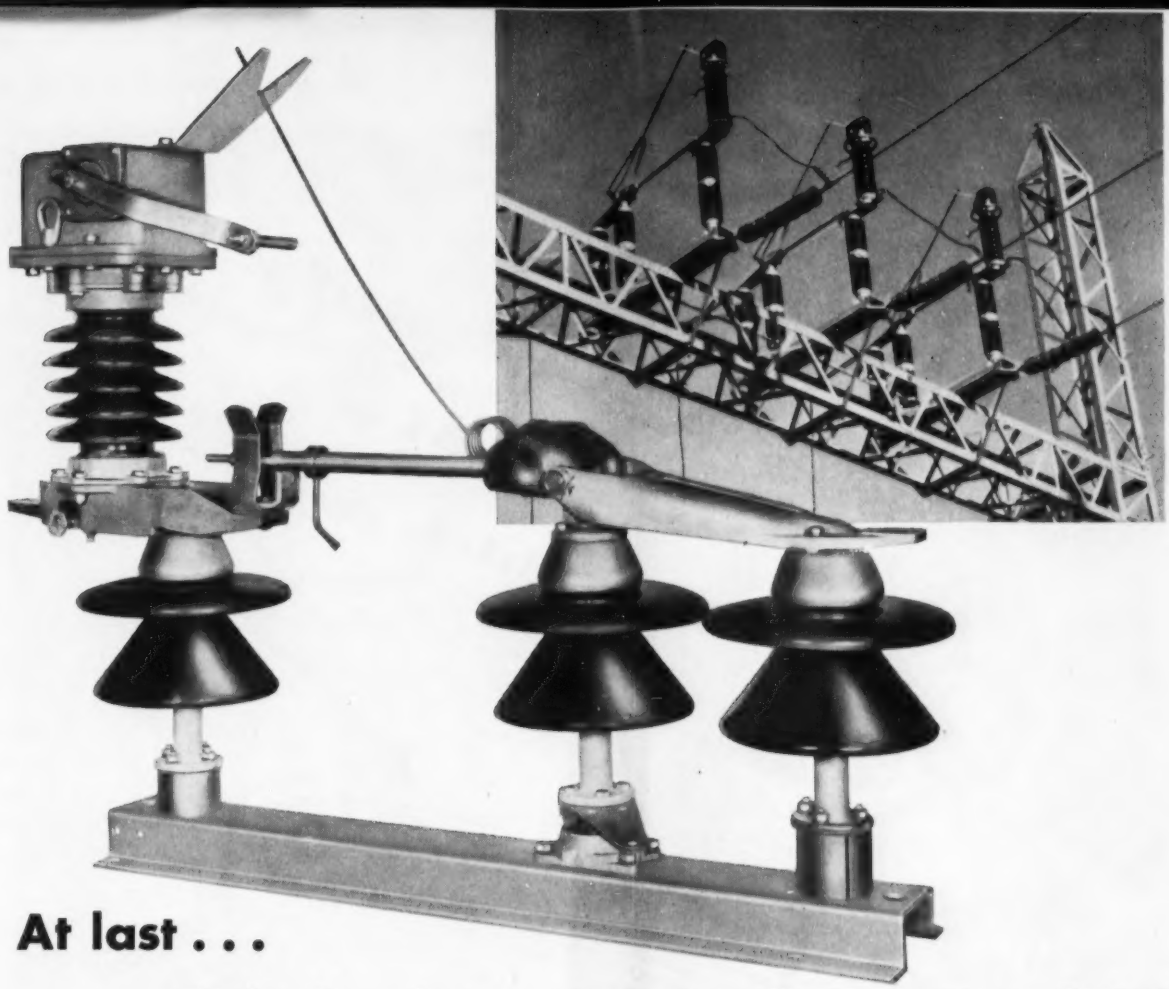
OIL-TIGHT HEAVY DUTY

Available in 1 to 16 unit sizes. 6-9-12-16 unit stations have hinged covers for easier wiring

Write **for Pushbutton Bulletins which give complete details. Address Square D Company, 4335 Valley Blvd. Los Angeles 32, Calif.**

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY



At last . . .

a switch that interrupts load current safely!

Exclusive Westinghouse VLB Switch can reduce switching costs—Now you can use the inexpensive Westinghouse VLB Switch to interrupt load currents on high-voltage transmission lines. The arc is completely enclosed so that it *cannot* develop into a system fault—a distinct possibility if horn-gap switches are used for interrupting duty (a job for which they're not designed).

Interrupts 600 amps—The VLB interrupts line-charging current, transformer magnetizing current or up to 600 amps of load current. Dependable performance under all these conditions provides the basis for interrupting rating.

New interrupter—The problem in designing the VLB Switch was to develop a small but effective interrupter to add to the standard air break switch. It was solved by using a gas, sulfur hexafluoride, which has exceptional arc-extinguishing properties.

No gas loss—This switch may be operated like a conventional disconnecting switch. When the main blade is raised, the current is carried through the interrupter. The blade engages an arm on the interrupter unit which trips a toggle and snaps open the contacts. The interrupter is hermetically-sealed and no gas is consumed during operation, nor does it deteriorate.

Thoroughly tested—Exhaustive laboratory tests of the VLB show that it is a NEMA Class A device and will operate 500 times without maintenance. Field tests have confirmed laboratory findings.

Replaces air switches—The new switch is available in ratings from 7.5 to 115 kv (138 kv effectively grounded). It can replace existing air switches. Write now for descriptive information on this new device that makes an air break switch do what you have always wanted. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-60847

YOU CAN BE SURE...IF IT'S

Westinghouse

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver

NEW BENJAMIN "PANEL-GLO"

NEW BENJAMIN "SKY-GLO"

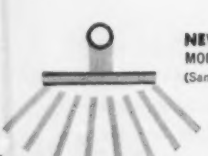
You need not forego the many advantages of a Benjamin Luminous Louvered Ceiling... comparative costs show why!

Even when you compare on the simple basis of material and fixture costs alone, it is often more economical to use a Benjamin Ceiling as against conventional individually-hung units. Especially in areas where it is desired to modernize by lowering the ceiling to cover up ugly ducts, pipes or cracks, Benjamin Louvered Ceilings are even more economical. In addition to furnishing higher light-levels, these "ceilings of light" actually modernize old-fashioned store areas, school-rooms, offices, etc. to make them "look young again" without plastering or other re-decorating expense.

Send for FREE "Sky-Glo" and "Panel-Glo" Data Bulletin. Benjamin Electric Mfg Co., Dept. J, Des Plaines, Illinois.

NEW Simplicity brings down installed price!
New, practical, easy-to-handle 3′ x 3′ translucent panels or louver sections.

NEW, Easier installation brings down installed price!
No need to order "fill-in" size panels. Trim them yourself with scissors... right on the job... to the exact shape desired!
New metal FINISHING STRIPS neatly hide trimmed edges on either louver or luminous-panel jobs.



NEW, proven TRANSLUCENT plastic material means MORE LIGHT with CONTROLLED BRIGHTNESS.
(Same material used for "Sky-Glo" and "Panel-Glo.")

Benjamin "Sky-Glo" and "Panel-Glo" Ceilings are approved by Underwriters' Laboratories

NOW, figure the complete price of a ceiling-lighting job by the sq. ft.!
Sq. ft. price includes all panels or louver sections as well as all the channels, fittings, etc. you need to complete the installation!*
No calculating, no figuring.. just know the area of the room!
No layouts necessary for regularly-shaped rooms.
*lighting equipment not included.

BENJAMIN *Lighting Equipment*

sold exclusively through electrical distributors

B-405

50 Years

May 11, 1954

Rounds Out Fifty Years of Producing

Electrical Boxes *and* Conduit Fittings

DESIGNED TO

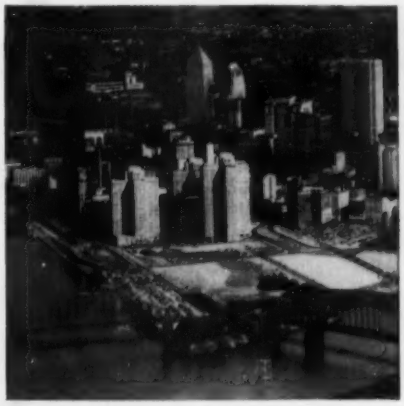
Do Better Jobs Quicker

Starting with the manufacture of limited lines of locknuts, brass bushings and cast iron floor boxes in 800 square feet in a building on Pittsburgh's famous "Point," Steel City has developed lines of electrical boxes and conduit fittings now taxing manufacturing facilities occupying more than 148,000 square feet of space in Pittsburgh's North Side. Facilities for production of Steel City-Kindorf Conduit Hangers and Supports are steadily requiring more space than is provided in Oakland, California, making necessary enlarging the Pittsburgh plant.

This growth has been due to these important facts—

(1) A thorough knowledge of the requirements of the items manufactured. (2) Designing such items for ease and time-saving installation. (3) The use of the best available material for their purpose. (4) Rigid inspection along production lines and before shipping to assure against loss of time caused by defective items reaching the job.

Better Jobs Quicker are assured when you specify or use the products of—



Pittsburgh's famous "Point" where the Allegheny and the Monongahela merge to form the Ohio River. This was the site of the building in which Steel City started business fifty years ago. It and many other buildings were razed for development of Pittsburgh's "Gateway to the West."

STEEL CITY ELECTRIC CO.

PITTSBURGH 33 PENNSYLVANIA

ELECTRICAL BOXES AND CONDUIT FITTINGS

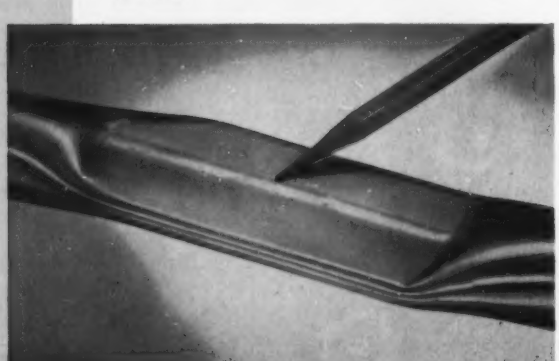
KINDORF DEVICES FOR INSTALLING CONDUIT

OUR 50th YEAR

These punishing tests

Thousands of pounds of pressure were used to flare this piece of Rome • RIGID like a trumpet at both ends. Yet, note how the weld remains firm.

Despite expanding more than 25%, followed by flaring, the weld here again remains as sturdy as ever.



Smashing blows like those of a drop hammer have flattened this piece of Rome • RIGID. Yet they could not disturb its powerful electric weld.

Available in 10-foot straight lengths, as well as 90° elbows. Sizes range from ½" to 6". Fully approved by Underwriters' Laboratories, Inc., Rome • RIGID meets all requirements for safe steel raceway . . . plus uniformly high quality. See your electrical wholesaler or call your nearest Rome Cable office today.

show why you get extra safety with Rome • RIGID steel conduit

The rigid conduit you install will never have to undergo tests any more severe than those put to these pieces of new Rome • RIGID.

Gruelling tests

Look at them. One has been flared like a trumpet at both ends. Another has been expanded more than 25%, then *flared*. Still another piece has been flattened by a force having the impact of a drop hammer.

Weld holds firm

Yet in all cases the weld holds firm. That is because Rome • RIGID is cold formed from shot blasted steel and electrically welded. In fact, it is the only rigid conduit in sizes ½" to 6" to be formed and welded in this way.

Advantages of electric welding

In addition to providing you with extra strength, the electric welding of Rome • RIGID also assures you uniformity of ductility, dimensions and concentricity.

Cleanest surface known

You'll find no oxidation and no scale on Rome • RIGID. The unique cold forming process eliminates these hazards often found with hot formed pipe.

Exceptional corrosion resistance

Perhaps, most important of all is the superior resistance to corrosion you get with Rome • RIGID. This is the only rigid steel conduit hot dip galvanized by Armco's patented Sendzimir process.

In this process the pipe is precisely heated, burning off all surface dirt, grease and scale. The surfaces are reduced to virgin metal, then cooled in the same atmosphere without ever coming in contact with the air.

The virgin clean surfaces are instantly coated with pure zinc inside and out. This uniform bond between bright, clean metal and molten zinc eliminates flux and assures years of safe, trouble-free service.

Easy to install

The Sendzimir process also provides uniformity of temper, plus easy fishing and pulling of wires.

Uniform diameters and careful threading assure simple connections, materially cutting installation time and costs.

Western Sales Offices:

Salt Lake City 1, Utah
230 South 4th West

San Francisco 24, Calif.
1100 Selby Street

Denver 4, Colo.
1160 Elati St.

Los Angeles 22, Calif.
2510 South Malt Avenue

Seattle 4, Wash.
3430 Fourth Ave., So.

Portland 5, Ore.
1020 S. W. Taylor St.

It Costs Less to Buy the Best

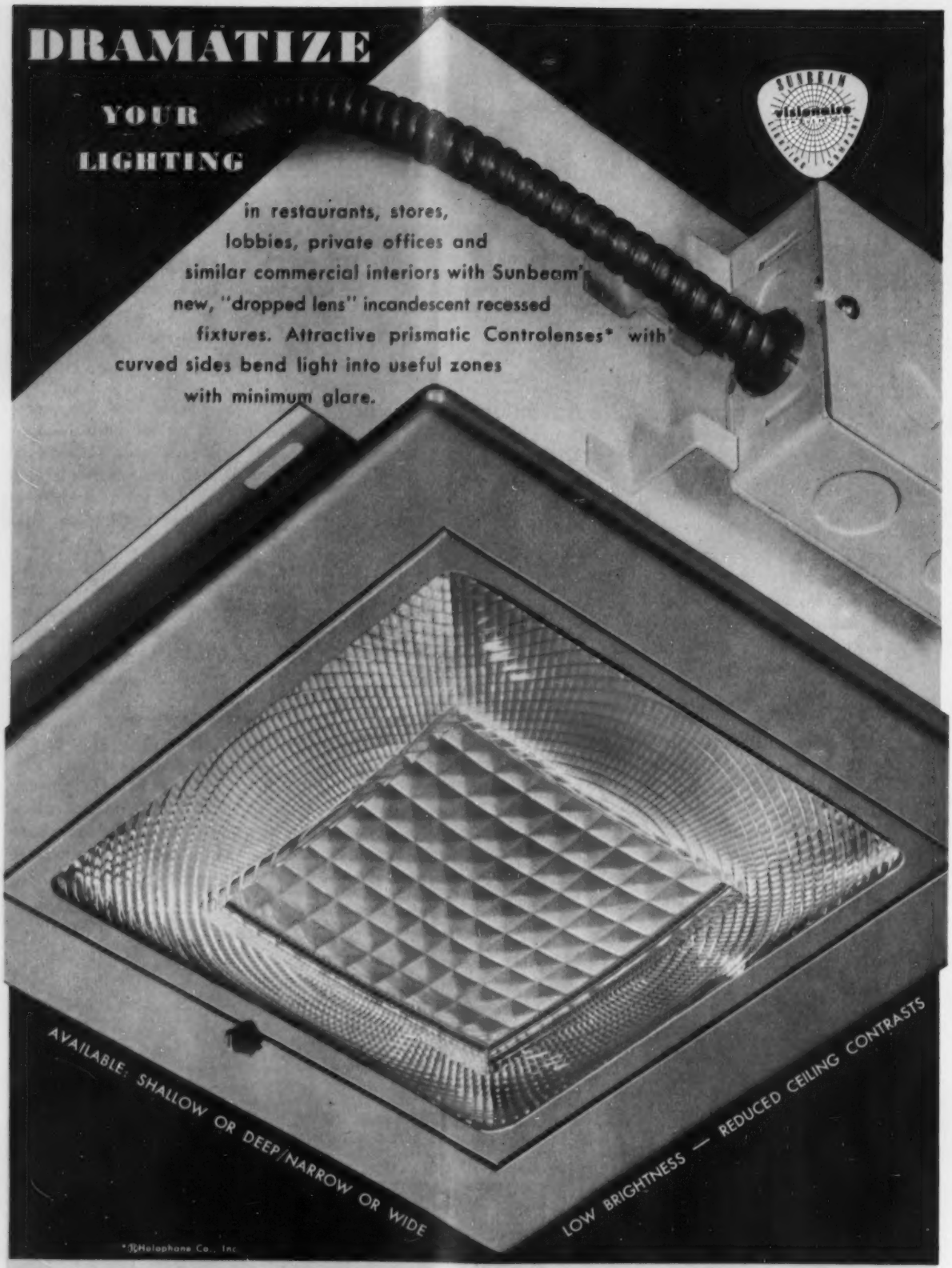
ROME CABLE
Corporation
ROME • NEW YORK
and
TORRANCE • CALIFORNIA

ROME CABLE ROME, N.Y.

DRAMATIZE

YOUR LIGHTING

in restaurants, stores, lobbies, private offices and similar commercial interiors with Sunbeam's new, "dropped lens" incandescent recessed fixtures. Attractive prismatic Controlenses* with curved sides bend light into useful zones with minimum glare.



*Holophane Co., Inc.

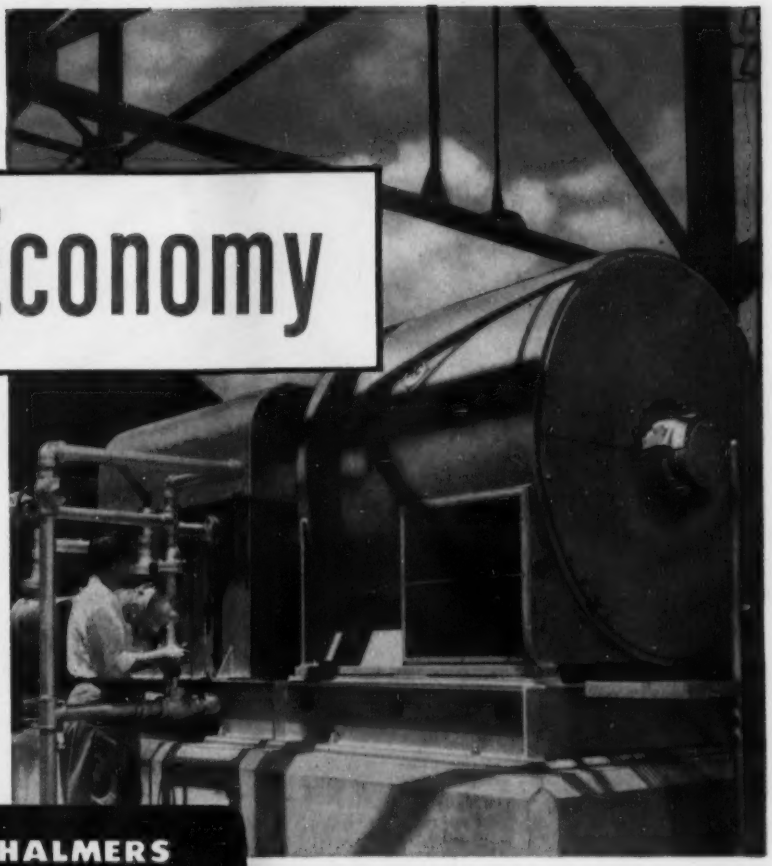
SUNBEAM LIGHTING COMPANY • 777 EAST 14TH PLACE • LOS ANGELES 21, CALIFORNIA

3-Way Economy

OPEN SKY is all the roof they need

MAINTENANCE is cut to the minimum

RELIABILITY assures maximum availability



ALLIS-CHALMERS
Tube-Type
TEFC MOTORS

Induced-draft fan motor for A-C turbine-generator equipped installation at Georgia Power's Plant McManus is rated 900 hp, 2300 volts, 705 rpm.

WITH Allis-Chalmers *tube-type* totally-enclosed fan-cooled motors, you can cut auxiliary drive costs three ways. The opportunity for low installation cost through outdoor applications is only the beginning. Low maintenance and peak relfability both pay worth-while dividends throughout the long life of these motors.

These savings can be yours because the *tube-type* air-to-air heat exchanger design of Allis-Chalmers TEFC motors offers these advantages:

Complete enclosure protects stator core and other electrical parts from dirt and corrosion — indoors or out — under the most severe ambient conditions.

Self-cleaning action results from generous flow of outside air through smooth, straight, heat-exchanger cooling tubes.

Full internal air circulation provides efficient, even cooling for long, trouble-free insulation life . . . and makes large ratings practical.

Available in sizes from 40 hp at 600 rpm to the largest required for power plant auxiliaries, this motor design has been proved in operation by hundreds of installations since 1946. For more information ask your A-C representative for Bulletins 51B7149 and 05B7150, or write to Allis-Chalmers, Milwaukee 1, Wisconsin. A-4258

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

Easier wire pulling
WHY
YOUNGSTOWN BUCKEYE
CONDUIT IS BETTER
Youngstown is the one manufacturer who makes rigid steel conduit from ore to finished product. This enables Youngstown to control the complete manufacturing process—your insurance that each length of "Buckeye" is made of top-grade steel.

Youngstown

QUALITY YOUNGSTOWN SERVICE

●Smooth bends reduce wire pulling time, especially where workers are cramped for room. Buckeye always bends easily and smoothly. Interior surfaces are mirror-smooth, never chip or break under bending or shock. That's why so many contractors specify Youngstown rigid steel conduit.

THE YOUNGSTOWN SHEET AND TUBE COMPANY
Manufacturers of Carbon, Alloy and Yoloy Steel
General Offices: Youngstown, Ohio - Export Office: 500 Fifth Avenue, New York 36, N. Y.
PIPE AND TUBULAR PRODUCTS - CONDUIT - BARS - RODS - COLD FINISHED CARBON AND ALLOY BARS - SHEETS - PLATES - WIRE - ELECTROLYTIC TIN PLATE - COKE TIN PLATE - RAILROAD TRACK SPIKES

We can prove it...you can now get

3 to 5 times the usual service life

on all your electrical equipment...without frequent oil purification...without costly maintenance

As you know, "sludge" wrecks insulating oils . . . and most electrical equipment—*sooner or later*. It all depends on how effectively the oil "fights" oxidation—main cause of "sludge."

To fight oxidation most effectively, an oil must be a *perfect combination* of the very finest base oil and anti-oxidant inhibitor. But not all base oils respond equally well to given amounts of inhibitor.

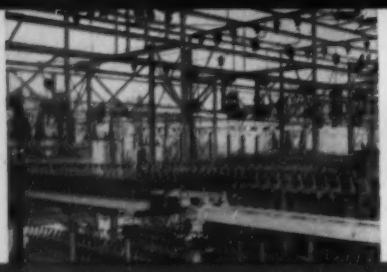
To discover the best combination, Shell scientists tested hundreds of specially-refined base oils with Shell's own highly-effective inhibitor.

The one combination that proved *outstanding* was Shell Diala Oil AX.

And in actual use under the toughest operating conditions, this remarkable insulating oil resists oxidation so effectively that—*years* after ordinary oils have failed—Shell Diala Oil AX has been found to be "sludge-free"!

If you're not using Shell Diala Oil AX now—you're probably not getting full service life from your electrical equipment. Why not get the full story about Shell Diala Oil AX from your nearest Shell representative—*today?*

SHELL



L-M's New VDS Method

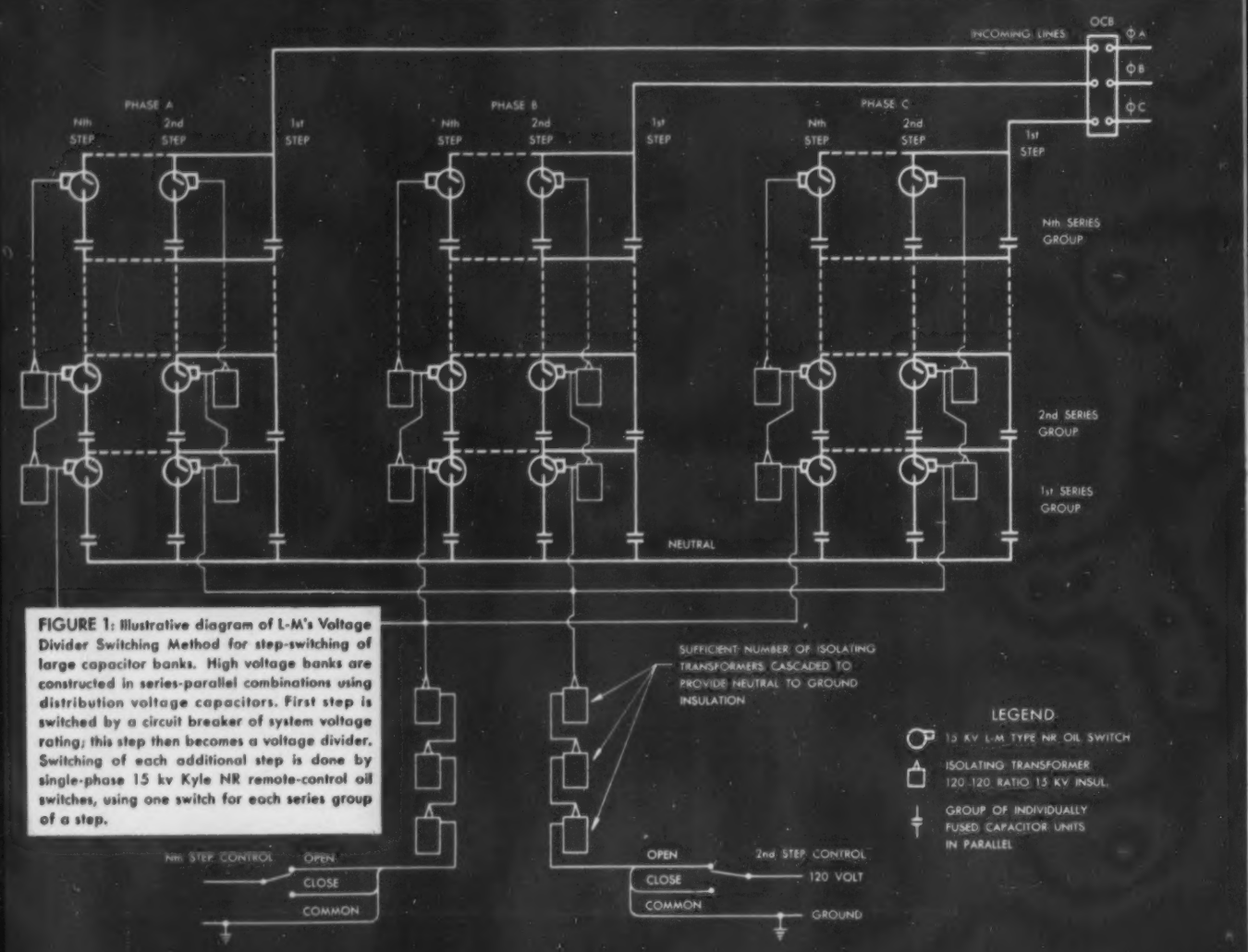
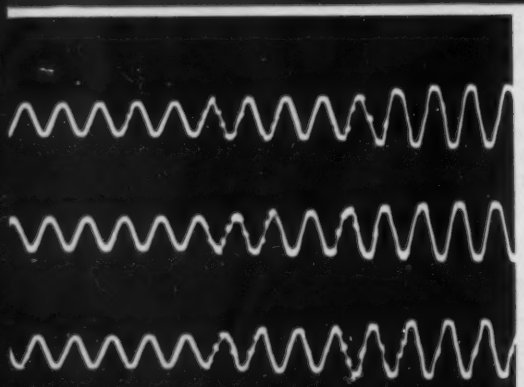


FIGURE 1: Illustrative diagram of L-M's Voltage Divider Switching Method for step-switching of large capacitor banks. High voltage banks are constructed in series-parallel combinations using distribution voltage capacitors. First step is switched by a circuit breaker of system voltage rating; this step then becomes a voltage divider. Switching of each additional step is done by single-phase 15 kv Kyle NR remote-control oil switches, using one switch for each series group of a step.



Oscillograms show that the random operation of a number of switches, all within approximately ½ second, eliminates any system disturbance. Figures 2 and 3 show the switching on and off of a 5250 kvar step of capacitors at 46 kv by 21 Kyle oil switches comprising seven series groups per phase. The current increases or decreases smoothly as the 21 switches operate at random times.

FIGURE 2—ON

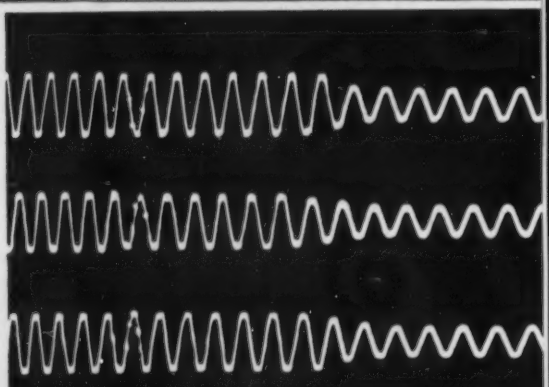


FIGURE 3—OFF

Cuts Capacitor Switching Costs 40%

L-M develops low-cost method of switching large multi-step capacitor banks. Known as the Voltage Divider Switching Method (patent applied for), this method permits substituting low-cost 15 kv oil switches for circuit breakers on all but the first step of multi-step banks from 23 to 230 kv.

by **P. M. MINDER**
Application Engineer
Line Material Company

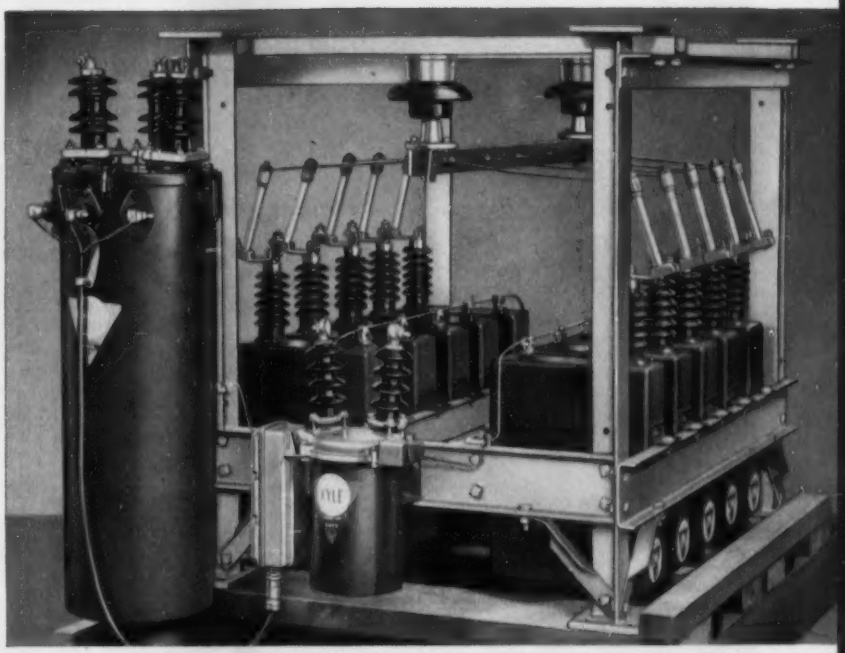
With the trend toward installation of capacitors on transmission and subtransmission circuits, capacitor switching has become a problem of economics. Large banks sometimes must be switched in a number of steps. The conventional practice requires a large breaker for each step. Thus the cost of switchgear for these large multi-step banks may become prohibitive.

L-M's Voltage Divider Switching Method utilizes L-M's Kyle NR remote-control 15 kv oil switches on all but the first step of a large bank. While a number of these switches are required, they cost only about $100 each, and even a number of them cost far less than a large breaker.

Cost Cut 40%, For Example

Here is an example of the comparative cost of switching by the conventional method and the VDS Method. Figures are based on a bank rated at 69 kv, 15,750 kvar, with 3 steps, each 5250 kvar.

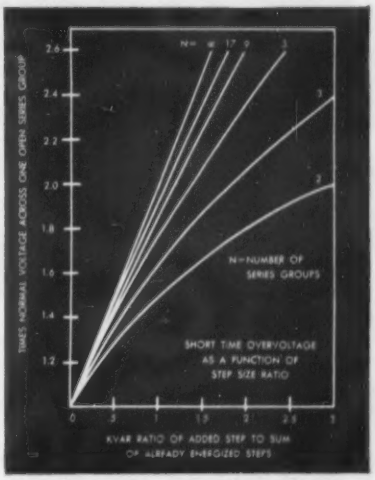
Figures include cost of switching equipment only. They do not include cost of automatic control equipment in either case. Nor do they include cost of installation, or the saving in foundations for two additional large breakers. It is evident that, in any case, the use of the VDS Method offers substantial savings. Discussion with one of the L-M Field Engineers will help you arrive at reasonably close figures for any individual application.



L-M's new factory-assembled stacking unit. The unit includes ten or more 25 kvar capacitors and the required fuses, Kyle NR switches, and isolating transformers mounted on the end of the frame. These stacking units are available in sizes from 250 to 600 kvar.

Figures Show What You Can Save With L-M's VDS Method

Conventional Method:	
1 OCB, 2500 MVA interrupting capacity; cost, about	$20,000
2 OCB's, 1000 MVA interrupting capacity; cost, about $13,500 each	27,000
Total, about	$47,000
Voltage Divider Switching Method:	
1 OCB, 2500 MVA interrupting capacity; cost, about	$20,000
2 switched steps using 30 Kyle NR switches (15 in each step) and equipped with all necessary isolating transformers and insulators; cost, about	8,400
Total, about	$28,400
Saving, VDS Method over conventional, about	$18,600


TIMES NORMAL VOLTAGE ACROSS ONE OPEN SERIES GROUP
N= ∞ 17 9 3
N=NUMBER OF SERIES GROUPS
SHORT TIME OVERVOLTAGE AS A FUNCTION OF STEP SIZE RATIO
KVAR RATIO OF ADDED STEP TO SUM OF ALREADY ENERGIZED STEPS

Overvoltages occur on the various series groups during switching. The highest overvoltage occurs when all but one switch of the second step are closed. These overvoltages are of brief duration and are kept at a safe magnitude by proper bank design.

Get Complete Information—Details of the new L-M Voltage Divider Switching Method (patent applied for) are available in a technical paper. Ask the L-M Field Engineer for a copy, and for information about L-M's Capacitor Application Engineering Service. Or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

170

LINE MATERIAL *Elemex Capacitors*

To keep in step with your constantly changing business, your communication system should be examined periodically. In that way, your communications never become outdated — always meet your exact needs at the lowest cost. If you have Bell System service, such studies are a continuing activity.

Bell System communication engineers will also help you take a good, close look at your own communications . . . *at no cost to you!* Their detailed study will help you get the most efficient use of your facilities . . . whether they are long distance, mobile, teletypewriter, or metering and supervisory control.

A growing number of power companies are taking advantage of Bell System service in meeting the communications demands of modern operation.

• • •

If you are interested in a detailed communication survey by Bell System engineers without charge, call your local Bell Telephone representative now.

PRIVATE-LINE TELEPHONE

TELETYPEWRITER

MOBILE TELEPHONE

METERING CHANNELS

BELL TELEPHONE SYSTEM

In the winter of 1870-1871 three miles of Kerite telegraph wire were laid from the weather observation post on top of Mt. Washington, N. H., to the railroad station at the base. At great hazard, men laid the wire over a high trestle on Jacob's Ladder and on the ground where it was subjected to the most severe conditions. The performance of Kerite insulation was largely responsible for keeping these lines of communication open.

PERFORMANCE

Kerite's unique and exclusive cable insulation has been unexcelled for dependable performance in the past century.

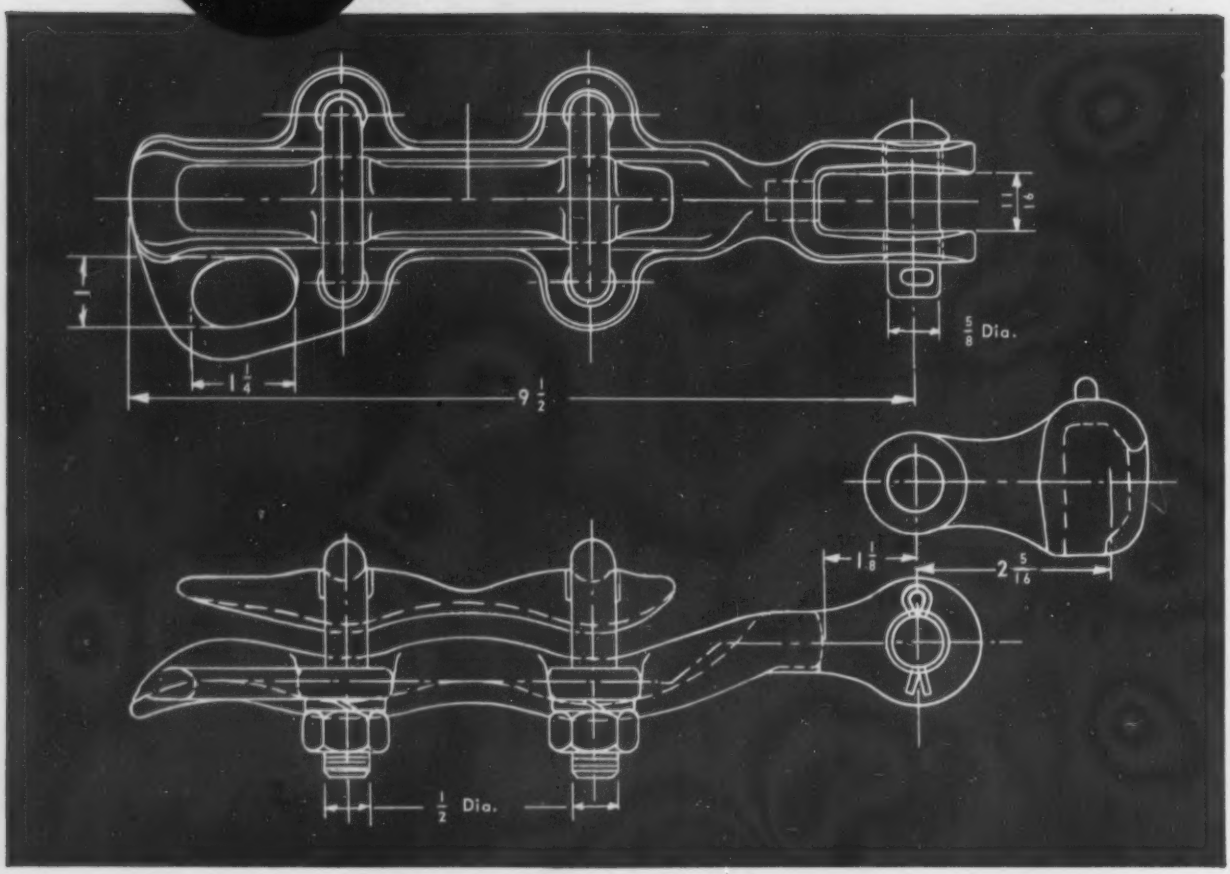
The value and service life of a product can be no greater than the integrity and craftsmanship of its maker.

KERITE CABLE

THE KERITE COMPANY—30 Church St., New York 7, N. Y.
Offices also at 122 S. Michigan Ave., Chicago; 582 Market St., San Francisco; 3901 San Fernando Rd., Glendale 4, Calif.; 31 St. James Ave., Boston

Newly Developed . . .

BTC ALUMINUM & STEEL



IT'S AVAILABLE NOW . . . a BTC Strain Clamp developed for distribution, light transmission and substation use on all conductor within its bore size range, including Copper, All-Aluminum, 18 x 1 and other A.C.S.R. Conductors. This new lightweight clamp is amply strong . . . follows advanced clamp design. It incorporates the superior features found in the BTC standard line of forged steel and aluminum (MPL) Strain and Suspension Clamps.

The corona-free beaded aluminum or steel body of the new clamp is drop-forged for greater strength. The smooth die-forged wave form cable seat develops adequate slip strengths. The 1" x 1¼" loop is of ample size to accomodate come-along hook or shackle. All steel parts are hot-dip galvanized to give longer service.

The point of first conductor-to-clamp contact in the BTC Straight Line Clamp is well within the bell-mouthed clamp end. The section of conductor subject to vibration bending is carried over a generous radius and length and is free from clamping pressure which is first applied very lightly and gradually increased into the high pressure area under the U-Bolts. The design prevents destructive localized concentration of tension and vibration-bending stresses and insures against high clamping pressure damage to conductor at clamp mouth.

The assembly may be supplied with a drop-forged Socket Adapter. Use of Copper or Aluminum liners is recommended in steel clamps.

Next time you order from your insulator manufacturer, specify BTC Straight Line Clamps. They are an important part of the complete BTC line of forged transmission line hardware.

STRAIGHT LINE CLAMP

BTC Straight Line Clamp appears actual size in this illustration.

CATALOG NUMBER	BODY MATERIAL	ADAPTER	BORE SIZE		ULTIMATE STRENGTH
			MIN.	MAX.	
5100	Steel	None	.46	.90	15,000 lbs.
5148	Steel	Socket	.46	.90	15,000 lbs.
5400	Aluminum	None	.46	.91	12,000 lbs.
5448	Aluminum	Adapter	.46	.91	12,000 lbs.

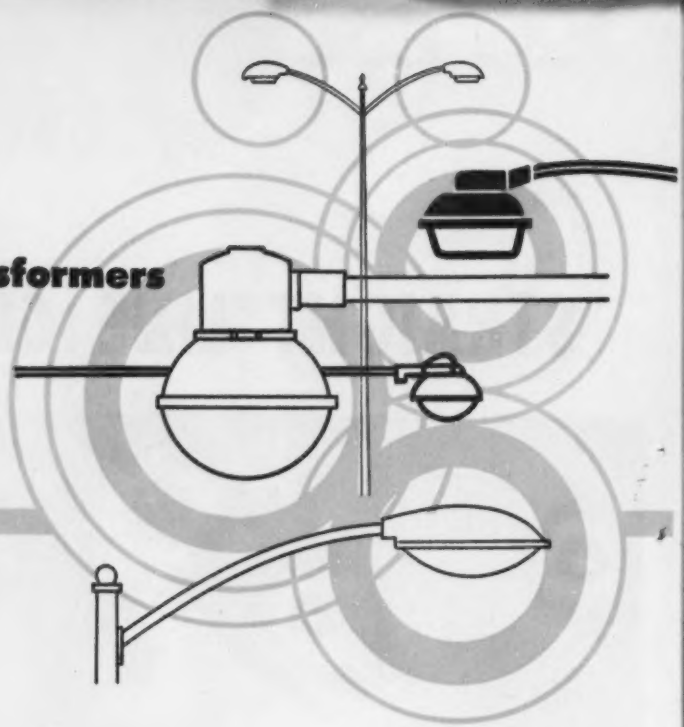
Drop Forged BTC Hi-Line Hardware

Sold Through Your Insulator Manufacturer Only

The BREWER-TITCHENER Corporation

Cortland · New York

high lighting efficiency
low maintenance cost
with Kuhlman Series Transformers



Utility engineers are well aware of the importance of good current regulation to maximum street lighting efficiency. The amount of illumination and length of life of incandescent lamps depends almost entirely on this one factor. Kuhlman engineers, knowing this too, utilize the bent iron core which gives Kuhlman Series Transformers unusually close current regulation, insuring greater lighting efficiency at lower cost for street lighting systems. The construction of the core reduces the exciting current to approximately 75% of that required for butt joint core types at the same core density, thus providing Kuhlman Series Transformers with a guaranteed voltage regulation of 1% over a range from 80% load to 110% load.

Kuhlman Series Transformers permit the use of low voltage cable from transformer to lamp, eliminate system outages that are caused by trouble between the main circuit and the lamp, and help protect lamps from line surges. These units are compound filled and equipped with a drawn copper bearing steel case that is highly resistant to corrosion and practically eliminates maintenance. Kuhlman Series Street Lighting Transformers are made for manhole, pole base or aerial mounting. Utility engineers can get complete information by writing today for Bulletin CS-801. Kuhlman also manufactures Power, Dry Type, Subway, Saf-T-Kuhl, CSP, and Rural Distribution Transformers. Ask for our bulletins on these units also.

145-T

KUHLMAN

KUHLMAN ELECTRIC COMPANY, BAY CITY, MICHIGAN • Southern Division, CRYSTAL SPRINGS, MISSISSIPPI

EXPORT REPRESENTATIVE: INTERNATIONAL STANDARD ELECTRIC CORP., 15TH FLOOR, 50 CHURCH STREET, N. Y. 7, N. Y. CABLE ADDRESS: MICROPHONE, N. Y.

SIXTY YEARS OF PROGRESS IN THE ELECTRICAL INDUSTRY

THE 1-2 SPLICE

HOW TO MAKE THE WORLD'S SAFEST, MOST COMPACT CONNECTION

(1) FASTEN WIRES WITH "SCOTCHLOK"

...the toughest, tightest-gripping spring connectors ever made. Just twist on, snap off winding stem and insulate with "Scotch" 33. No soldering, no tools required. Never shakes loose. One size handles over 300 wire combinations from AWG 10 down to AWG 16. And it's neat, trim and *compact!*

(2) INSULATE WITH "SCOTCH" NO. 33

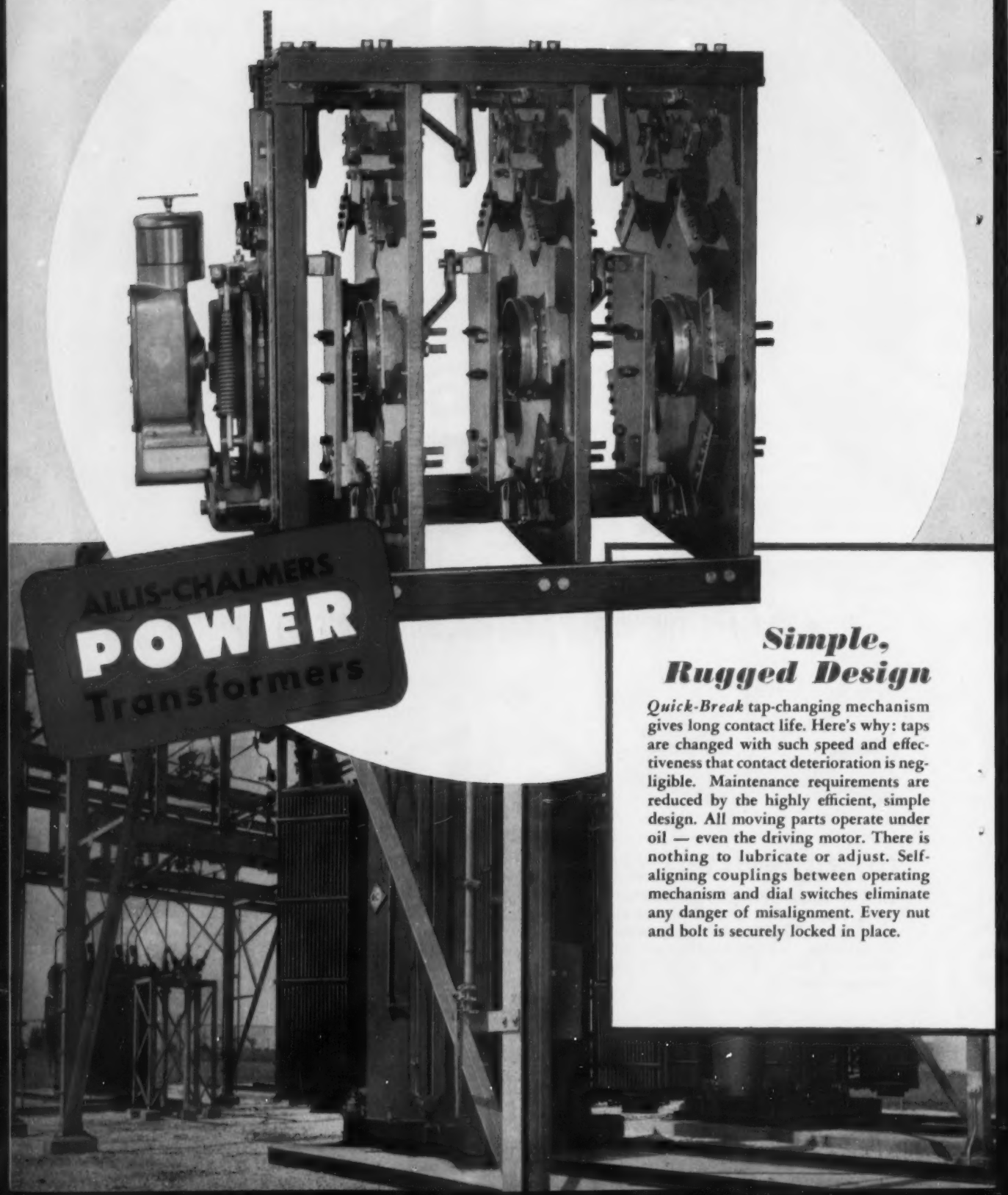
...the super-thin plastic tape that's a perfect companion to "Scotchlok." Start as shown, bring forward between the wires and wrap until tape extends ½-inch beyond small end. Fold extension over and wind back toward bell end. Easy! Order a supply of "Scotchlok" and "Scotch" 33 today!

The term "Scotch" and the plaid design are registered trademarks for the more than 200 pressure-sensitive adhesive tapes made in U.S.A. by **Minnesota Mining & Mfg. Co., St. Paul 6, Minn.** — also makers of "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Abrasives, "3M" Adhesives. General Export: 122 E. 42nd St., New York 17, N.Y. In Canada: London, Ont., Can.

3M

SCOTCH BRAND Electrical Insulating Products

20 Years'



Simple, Rugged Design

Quick-Break **tap-changing mechanism gives long contact life. Here's why: taps are changed with such speed and effectiveness that contact deterioration is negligible. Maintenance requirements are reduced by the highly efficient, simple design. All moving parts operate under oil — even the driving motor. There is nothing to lubricate or adjust. Self-aligning couplings between operating mechanism and dial switches eliminate any danger of misalignment. Every nut and bolt is securely locked in place.**

Field Proof-

Here's the Tap-Changing-Under-Load Mechanism That Has Given 20 Years of Unequalled Performance

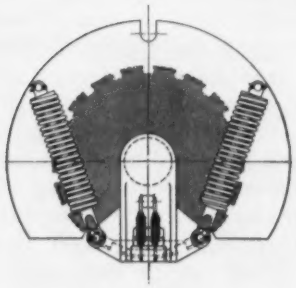
Field-proved — and unsurpassed in twenty years — that's the story behind Allis-Chalmers famous *Quick-Break* tap-changing mechanism. No other tap changer on the market gives you its combination of ruggedness, accuracy, and simplicity — features that add up to practically trouble-free operation.

Laboratory-proved — tests show that the *Quick-Break* mechanism will withstand 5 million operations — equivalent to over one hundred years of normal service. The *Quick-Break* mechanism was designed to operate under the most difficult conditions. After twenty years of field operation, it is still the simplest, most efficient means of changing taps under load.

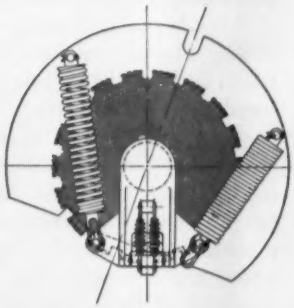
Get More Facts. If you don't have all the facts already, it will pay you to get more details by contacting your nearby Allis-Chalmers office or writing Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4193

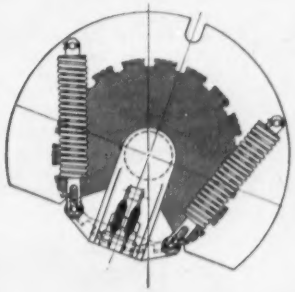
How It Works



1 Dial switch operates on the balanced spring principle. Components include outer moving segment, inner stationary index plate, and powerful springs for fast drive snubbing action.



2 Start: driving motor rotates outer segment but latch on crank arm holds tap switch in position. Heavy-duty springs store energy to produce quick start and stop of switch.



3 Finish: cam on segment lifts latch. Released spring tension rotates switch swiftly to next operating position. Latch locks switch and places mechanism in position for next change.

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

CARCO

Steel Light Poles

Carco standard transformer base poles have uniform anchor bolt spacing regardless of mounting height or length of anchor bolts. The above cut-away drawing shows this desirable standardization. Erection and plumbing are combined in one operation through placing an extra nut on each anchor bolt before setting pole. The adjustment of these nuts easily brings pole to plumb. Shimming is eliminated. Carco standard anchor base poles also have this important feature.

Why Carco steel light poles are tops for western buyers

If you're a western buyer of street lighting equipment you'll want to know about Carco steel light poles. For Carco poles have earned such acceptance they now adorn the streets and boulevards of many cities in each of the eleven western states, Alaska and Hawaii. Meeting all the requirements of the I. E. S. street lighting code, Carco poles are graceful and handsome in appearance. Their design is so versatile that buyers find in them custom-built flexibility at mass-production cost. This versatility permits a wide latitude in mounting heights, bracket lengths and wiring. Having many important exclusive features that make for easy erection and maintenance, strength and permanence, Carco steel light poles are competitively priced. They can be delivered to your job without excessive freight costs or annoying delays. Inquiries are invited. Prices and specifications on special poles furnished on request.

A copy of the new catalog on standard Carco Steel Light Poles will gladly be sent you on request. Just send your name and address to our Light Pole Division.

PACIFIC CAR AND FOUNDRY COMPANY

RENTON, WASHINGTON

STEEL LIGHT POLES, RAILROAD CARS, TRACTOR EQUIPMENT: Winches, Logging Arches, Log Carts, Dozers
STRUCTURAL STEEL FABRICATION AND ERECTION, STEEL CASTINGS, FORGING

CARCO

Reduced Maintenance Improved Reliability

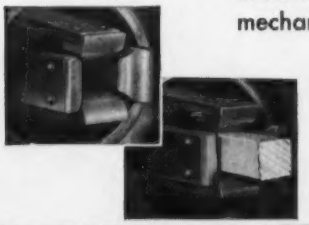
PACIFIC ELECTRIC
Type RHE
CIRCUIT BREAKERS

115, 138, 161 kv — 3 or 5 cycles
196/230 and 230 kv — 3 cycles
to 10,000,000 int. kva (ASA)
at 161 and 230 kv
(Also other types, 7.5 kv and up)

Electrically and Mechanically Trip Free
ASA, AIEE, and NEMA STANDARD

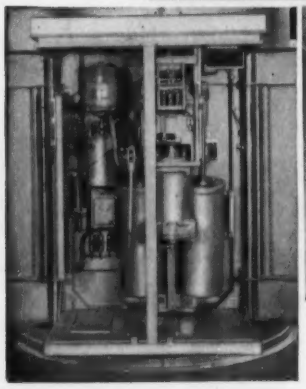
Applicable Standards of ASA, AIEE, and NEMA assure electrical performance of any breaker that meets such requirements . . . but *mechanical* construction, upon which maintenance cost and reliability largely depend, still remains subject to the manufacturer's design approach.

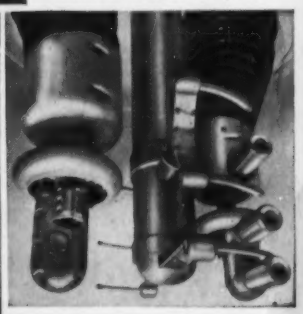
Pacific Electric solicits critical examination of its Type RHE breakers from both the electrical and mechanical standpoints.



At Left:
Sliding Shoe (finger) Contacts — Six Such Groups in Each Breaker (shown open and closed).

Below:
One-Piece Moving Contact Structure and Interrupters.





At Left:
Operating Mechanism with Oil-Hydraulic System.

Above:
Type RHE-64, 115 kv Circuit Breaker with Common-Base Mounting.

PACIFIC TYPE RHE Breakers embody mechanical features that contribute to low maintenance cost and improved reliability of the breaker and the substation at which it is located. These features assume increasing importance as the upward trend of wages and service salaries continues.

Only One Moving Element in the Tank—Opening accelerating springs and shock absorbers are outside of the tank. As no parts in the tank require service adjustment, maintenance within the tank is largely eliminated. Entrance bushings are under negligible mechanical stress.

Nested Sliding Shoe (finger) Contacts—Self-cleaning; arc foot-points confined to portions of surfaces that do not carry load current; minimizes contact dressing.

Oil-Hydraulic Restoration of Closing Energy—Simple; reliable. Full energy restoration in ten seconds by conventional oil-hydraulic components that also embody provision for decelerating the closing stroke.

Anti-Friction Bearings—Sealed and lubricated at time of assembly, require no further attention. Lubrication points practically eliminated.

Easy Manual Operation for Load Switching—If control power is lost, the breaker may be closed manually. Then two minutes' hand operation of the oil pump prepares the mechanism for O-C-O after fault, or for manual closing after manual opening—all at rated speeds.

These and other advanced features are described in Catalog 585.

Since 1906

SALES OFFICES or AGENCIES in PRINCIPAL CITIES

PACIFIC ELECTRIC MFG. CORPORATION

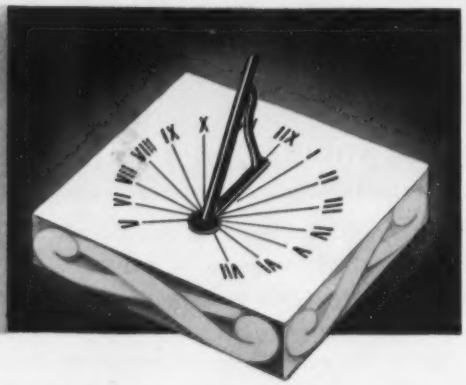
SUBSIDIARY OF FEDERAL ELECTRIC PRODUCTS COMPANY

5815 THIRD STREET, SAN FRANCISCO 24, CALIFORNIA

OTHER FACTORIES: SANTA CLARA, CALIF.; SCRANTON, PENNA.

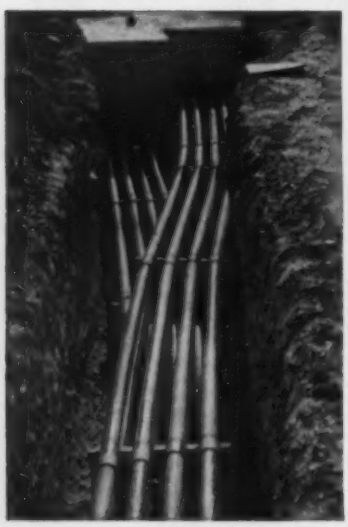
QUALITY

...proved by TIME...



Of course the most convincing proof of Orangeburg's enduring quality is its 60-year record of service to leading Public Utilities and Municipalities.

Quality stands out in every feature. Tough, resilient, non-metallic...Orangeburg Fibre Conduit does not easily crack or break. Its impermeable walls and tight joints keep out corrosive ground waters. Its smooth bore and low coefficient of friction protect cable sheaths from abrasion. Orangeburg material resists acids, alkalies, salt, grease, oil.



ORANGEBURG STANDARD is installed with concrete encasement. Preferred for banks of three or more ducts. It has installations in service over 60 yrs.

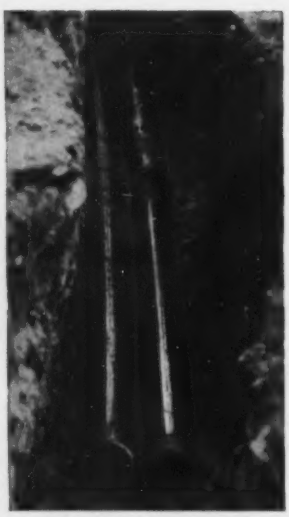
For these and other advantages Orangeburg provides complete security for electrical services underground. Result...no interruption of power. These vital services keep flowing.

SAVES MONEY, TOO!

Saves by prolonging cable life . . . by faster and easier handling, tooling and laying . . . and by the use of Orangeburg's standard fittings. They cut costs by simplifying installation.

Send to Dept. EF44 for more facts.

ORANGEBURG MANUFACTURING CO., INC.
Orangeburg, New York
West Coast Plant — Newark, California



ORANGEBURG NOCRETE is installed without concrete encasement. Extra heavy wall for direct burial—practical for many single or double duct runs.

ORANGEBURG® FIBRE CONDUIT

STANDARD INSTALLED WITH CONCRETE

NOCRETE INSTALLED WITHOUT CONCRETE

Graybar ELECTRIC COMPANY

DISTRIBUTORS, ORANGEBURG FIBRE CONDUIT

BRANCHES AND STOCKS IN PRINCIPAL CITIES

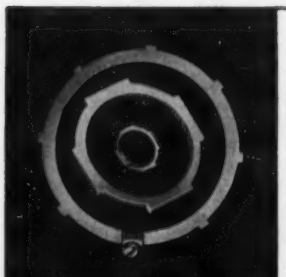
GENERAL ELECTRIC SUPPLY COMPANY

A DIVISION OF GENERAL ELECTRIC DISTRIBUTING CORPORATION

ANY FITTING YOU CAN THINK OF!

Gedney's got it... in malleable iron... accurately machined ... quickest, least costly to install

IT'S RIGHT THERE in the Gedney line... every fitting that you need for every sort of installation! And Gedney fittings are accurately machined and threaded... made of unbreakable malleable iron... individually inspected to assure you the lowest installed costs obtainable today! Always order Gedney fittings and you'll *always* make maximum savings of time and money.

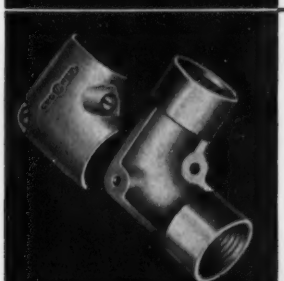


CONDUIT LOCKNUTS — sizes from ⅜" to 6". Sizes ⅜" to 1½" are made of heavy nut lock steel... all other sizes, malleable iron. All sizes **cadmium plated.** Also bonding wedge locknuts, ½" to 6".

3-PIECE CONDUIT COUPLINGS — come in a large range of sizes from ½" to 6". Malleable iron, cadmium plated.

CAPPED BUSHINGS—available in a standard range from ½" to 6". Made of unbreakable malleable iron, cadmium plated.

PIPE STRAPS — CLAMP BACKS and NEST BACKS — 1 hole — for rigid E.M.T. and service entrance cable. Available in a full range of standard sizes. Malleable iron, hot dip galvanized.



CORNER PULL-IN ELBOWS — made in ½", ¾", 1", 1¼", 1½," and 2" sizes. Outstanding for space saving, machine wiring, easy wire pulling. Malleable iron, cadmium plated.

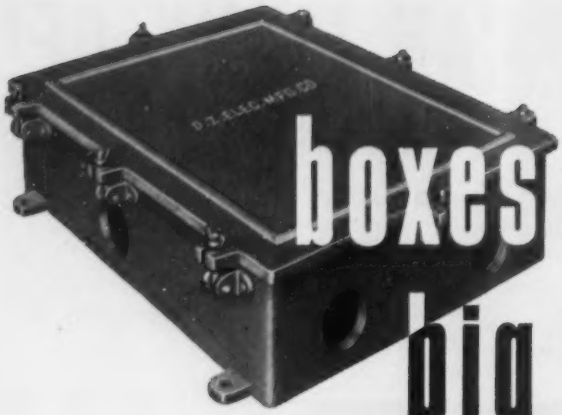
NAIL STRAPS — for rigid E.M.T. and S.E. cables with O.D. of .706 to 1.163 inches. In sizes ½", ¾", and 1". Malleable iron, cadmium plated.

GEDNEY FITTINGS FIT

GEDNEY
ELECTRIC COMPANY

GEDNEY

RKO BLDG. • RADIO CITY • NEW YORK 20
Foundry, Factory and Shipping Point: Terryville, Conn.



boxes are big business at O.Z....

So big, in fact, that our junction box manufacturing facilities are located in a new 35,000 square foot plant. Here, in a modern building, are men, equipment and space to fabricate a complete line of surface and flush-mounting junction boxes for every application and requirement. A large stock is maintained at all times for speedy delivery. Your O. Z. distributor is now in a better position than ever to fill your needs.

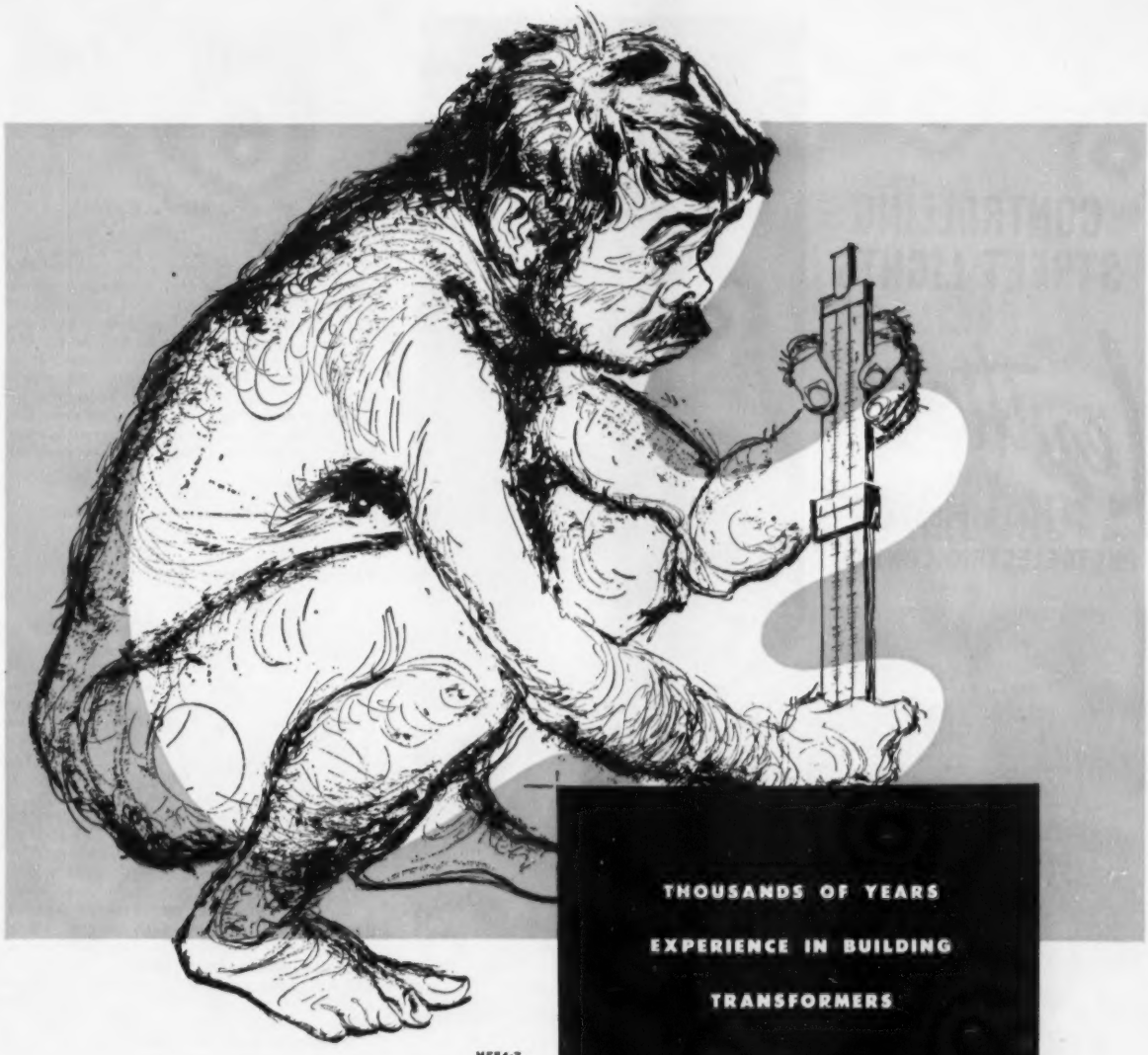
Modern equipment for fabricating junction boxes in this O. Z. box plant means greater efficiency for us ... better service for you.

Greatly increased stock assures a constant supply of standard junction boxes and speedy processing of your orders.

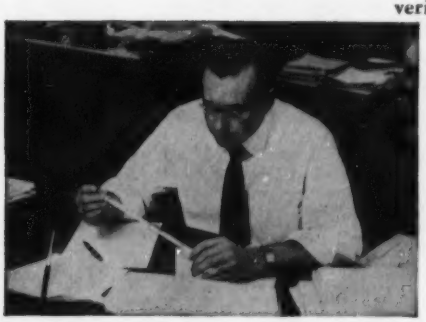
O.Z. ELECTRICAL MANUFACTURING CO., INC.

262 BOND ST. • BROOKLYN 17, N. Y.

CAST IRON BOXES • SOLDERLESS CONNECTORS
CABLE TERMINATORS • GROUNDING DEVICES
POWER CONNECTORS • CONDUIT FITTINGS



No, Moloney hasn't been building transformers for thousands of years. In fact, even though Moloney is a pioneer in the electrical industry, we are pretty young archaeologically. But we do have thousands of years experience in designing and building transformers exclusively. This is the experience which goes to work on your transformer problems, when needed . . . a veritable backlog which assures you of the best transformer possible . . . experience the progress of which can be traced through the maze of developments and improvements in transformers to today's gigantic and efficient product.

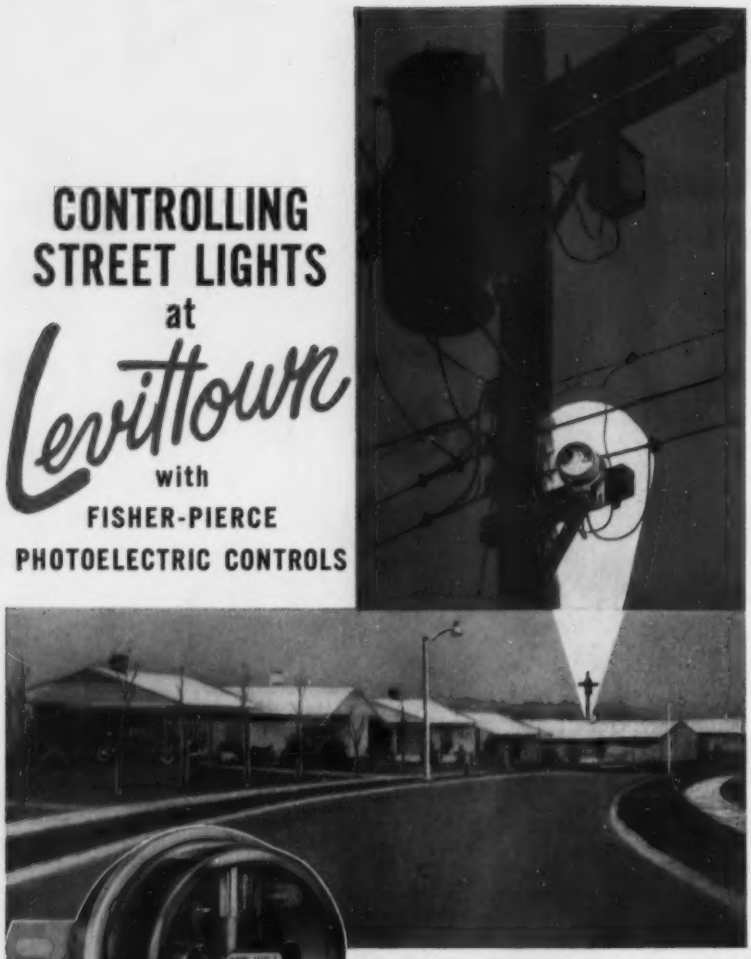


MOLONEY ELECTRIC COMPANY

Power Transformers • Distribution Transformers • Load Ratio Control Transformers • Step Voltage Regulators • Unit Substations • Electronic Transformers

Sales Offices in All Principal Cities

CONTROLLING STREET LIGHTS at Levittown with FISHER-PIERCE PHOTOELECTRIC CONTROLS



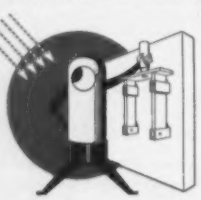
THE FISHER-PIERCE SERIES 63300C
The latest unit in a proven line of photoelectric controls for street lighting

To protect the citizens of the great new Levittown, "Delaware Valley, U. S. A.," which will be Pennsylvania's tenth largest city when completed, Philadelphia Electric Company chose Fisher-Pierce Photoelectric Controls for positive all-season control of street lighting. The *instant* that daylight falls below a safe level in Levittown, F-P Controls automatically turn street lights on, regardless of time of day, season, or weather conditions.

Fisher-Pierce maintains leadership in photoelectric street lighting control because each F-P unit is built to meet the rigid standards of reliability and quality demanded by utility engineers. For eight years, F-P Controls have been proven in use by hundreds of utilities in thousands of installations.

If you are considering modernizing your street lighting or are concerned with street lighting problems, consider the Fisher-Pierce Photoelectric Control.

WRITE FOR BULLETIN



The FISHER-PIERCE CO., Inc.
43 Pearl St., So. Braintree, Boston 85, Mass.

EXPORT: PHILIPS EXPORT CORP. 100 E. 42nd STREET NEW YORK 17, N.Y.

IN CANADA: NORTHERN ELECTRIC CO., Ltd.

LETTERS TO THE EDITOR

Private Weatherman's Case

To the Editor:

I have read with very great interest the article "Weather Is *Our* Business," which appeared in the March issue of ELECTRICAL WEST. Mr. Smith has, in my opinion, done an outstanding job in presenting the case for the meteorological engineer. It is to be hoped that the committee, on which Mr. Smith served for the Secretary of Commerce, through its report can pave the way for healthy expansion along such lines as he has suggested for the meteorological profession. . . .

IRVING P. KRICK, PH.D.
Meteorogolical Consultant, Denver

Particularly Rewarding

To the Editor:

You will appreciate that we receive a number of magazines in the electrical field. I sometimes am able to glance through them during office hours but most frequently I find it necessary to read them at home at nights and on week ends. There are times when I regard this as a chore but occasionally I feel particularly rewarded when an exceptional publication is picked up from my brief case.

The March 1954 issue of ELECTRICAL WEST was such an issue and I was glad to have it at home so that I could read it thoroughly. There are several items which I know Jim McCaffrey will want to read. I want to compare our average annual domestic consumption with several other organizations and, based on appliance sales figures, I am going to have a member of our staff visit San Diego and find out how a better job was done there on freezers and water heaters than we were able to do.

I could mention several other matters of interest but the foregoing are representative. Also, Walter Heston certainly did a nice job in writing up the annual conference of the California Municipal Utilities Assn.

I invariably find articles of interest in ELECTRICAL WEST but the March issue was so outstanding that I thought I would just drop a note of congratulations.

CARL L. RICHEY
Assistant General Manager
Sacramento Municipal Utility District

Answer Coming

To the Editor:

May I call your attention to the January 1954 issue of ELECTRICAL WEST, which contains an article headed "Spot Survey shows that One EE Is Needed for Each 10,000 Kw." I would appreciate it very much if you could tell me how this is broken up between electrical engineers in engineering, in operation and in sales or commercial activities.

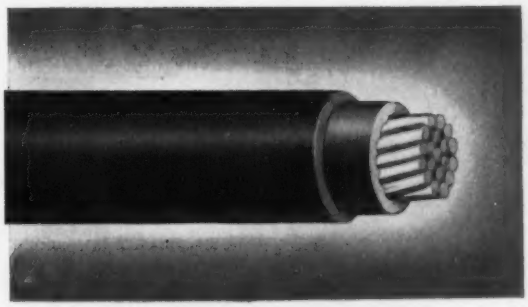
L. W. LENGNICK
Vice-President and Executive Engineer
Hawaiian Electric Co. Ltd.

Editor's Note: A future article answering this question is planned.

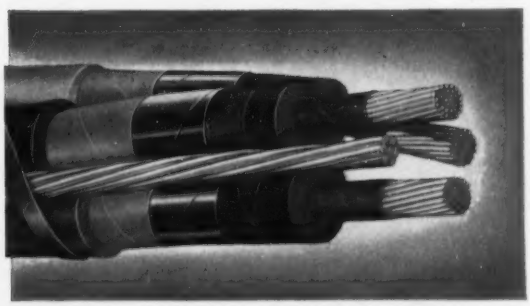
10 reasons why

you should specify, buy,

install U. S. GRIZZLY® POWER CABLES



U. S. Grizzly Power Cable, 600 volts—Type RR single conductor, Hydrosec®—S heat- and moisture-resistant insulation, Neoprene jacket.



U. S. Grizzly Power Cable, 15,000 volts—Type RR—3-conductor, Uskorona®—ozone-resistant insulation—shielded—Neoprene jacket.

1. Lighter in weight than lead-sheathed cables and lead-sheathed armored cables.
2. Greater flexibility
3. Easier to handle during installation
4. Easier to splice, tap and terminate
5. More resistant to chemical corrosion
6. Unaffected by stray currents
7. Better protection against weathering
8. Longer life
9. Cost less
10. Made by United States Rubber Company, the *only* electrical wire and cable producer to grow its own natural rubber, make its own synthetic rubber and manufacture its own plastics

U. S. Grizzly Power Cables are used for general power distribution, and can be installed in conduits, underground ducts, buried directly in the ground, or installed aerially. Neoprene jacket protects against acids, alkalies, oils, and mechanical damage and weathering. (All IPCEA and NEMA specifications complied with.)

Write to address below for free copy of illustrated reference manual on U. S. Electrical Wires and Cables for the electric utility industry. It lists the type of cable best suited for specific requirements.

US RUBBER

UNITED STATES RUBBER COMPANY

ELECTRICAL WIRE AND CABLE DEPARTMENT, ROCKEFELLER CENTER, NEW YORK 20, N. Y.

Years Ahead
in Engineering and Design . . .
Holophane's New Outdoor Unit

415

Product of Holophane Engineering Research, No. 415 is presented as an altogether different lighting unit. Its efficiency, dependability and design are the result of long experience in developing prismatically-controlled lighting equipment for almost six decades.

Unequalled Performance . . .

Asymmetric distribution spreads more light over the widest area . . . providing consistently high levels of illumination under all conditions . . .

Durable Construction . . .

Die-cast aluminum hood and double thick prismatic refractor assure full protection against the elements. Easy to install, easy to maintain—it's trouble-free!

Modern Design . . .

Perfectly proportioned, attractively streamlined, No. 415 is adaptable to any modern exterior.

FOR RESIDENTIAL USE
- Private Homes
- Driveways
- Garden Apartments
- Garages

FOR INDUSTRIAL USE
- Warehouses
- Loading Platforms
- Entrances
- Roadways
- Parking Lots
- Service Stations

FOR PUBLIC AREAS
- Shopping Centers
- Motels
- Hospitals
- Schools
- Churches
- Housing Developments

Write for Engineering Data

HOLOPHANE COMPANY, INC.

Lighting Authorities Since 1898 • 342 MADISON AVENUE, NEW YORK 17, N.Y.

THE HOLOPHANE COMPANY, LTD., THE QUEENSWAY, TORONTO 14, ONTARIO

Give the Guy a CHANCE

Build lines to stay with the CHANCE 8 Way

MIKE THE MOLE SAYS:

Only a mole can tell what goes on below "see" level!

Here's a typical example of a test result . . . This 200 square inch Chance 8-Way was pulled to nearly double its rated load without damage to the anchor.

MIKE'S RIGHT! You can't tell what happens to an anchor after it's installed unless it fails—or is pulled out in a test or dug out for examination. Chance has pull-tested all kinds of anchors all over the country to see what happens when anchors are subjected to heavy loads. These tests prove that the Chance 8-Way holds far more than its rated load because the eight blades expand to form a complete pyramid shaped square—there is no wasted space between blades. The guy load is equally distributed all around the hole.

8-Ways are available in a range of sizes for every requirement from guying rural phone lines to guying heavy transmission lines. There is a CHANCE Anchor Distributor in your area who can probably fill your order directly from stock. SPECIFY CHANCE FOR SERVICE!

ABC FOR INDUSTRIES

A·B·CHANCE CO.

CENTRALIA, MISSOURI
SAN FRANCISCO, CALIFORNIA

ANCHORS • GUYING FIXTURES • LINE CONSTRUCTION TOOLS • CONDUCTOR CLAMPS
GROUNDING EQUIPMENT • HOT LINE TOOLS • HIGH VOLTAGE SWITCHES • CUTOUTS

DISTRIBUTION TRANSFORMERS
different from others because.....
NEW

....Magne-valve arrester

(gapped valve-type) can be used any place on your system...regardless of short-circuit currents

Small in size and light in weight, the new General Electric Magne-valve arrester has impulse characteristics similar to those of G.E.'s modern pellet arrester—the quality standard of performance in the electrical industry. The new arrester—gapped to the bushing in the same manner as modern pellet arresters on unit-type 2400- and 4800-volt transformers—is now standard on all G-E EEI-NEMA 7200- and 7620-volt unit-type transformers.

NEW ARRESTER FEATURES:

Valve action—Thyrite* valve action is augmented by magnetic action of an internal series gap.

External gap—No 60-cycle voltage across arrester under normal operating conditions—no chance for grounding circuit if arrester is damaged.

Elimination of unnecessary breaker tripping—Unlike expulsion-type arresters, there is no short circuit during discharge and no erosion to limit the useful life of the arrester.

Small size and light weight—9-kv arrester, for 7200-volt transformer, is only 14¼" long, weighs only 10 pounds.

REMEMBER . . . all transformers are not alike . . . compare the General Electric plus features in the chart below and see for yourself.

For more information contact your nearest G-E sales office or agent, or write General Electric Company, Section 431-9, Schenectady 5, New York.

*Reg. trade-mark of General Electric Company

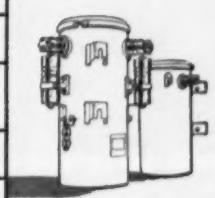
You can put your confidence in—

GENERAL ELECTRIC

ALL TRANSFORMERS ARE NOT ALIKE

(make this simple comparison and see)

FEATURE	General Electric	Mfr. A	Mfr. B	Mfr. C	Mfr. D	Mfr. E
Production-line impulse testing	YES	NO	NO	NO	NO	NO
Nitrile rubber gaskets at all tank openings	YES	NO	NO	NO	NO	NO
Strenicor pressure terminal clamps	YES	NO	NO	NO	NO	NO
One-piece cover band	YES	NO	NO	NO	NO	YES
Terminals designed for both copper and aluminum conductors	YES	NO	NO	NO	NO	NO
Gapped valve-type arresters	YES	NO	NO	NO	NO	NO
Nationwide company-operated service facilities	YES	YES	NO	NO	NO	YES



UNIT-TYPE CONVENTIONAL

"Take your choice G. E. makes both"

Easy to install...

That's why TRANSITE DUCTS save time, labor and money

THESE "ON THE JOB" photographs show why savings begin right at the start of the installation when you use Transite* Ducts.

The light weight of Transite Conduit and Korduct permits hauling a substantial footage of duct per truck. Handling is fast, too, because the asbestos-cement composition of Transite Ducts makes them strong and tough. The longer length of each duct . . . 10 feet . . . reduces the number of joints in the completed line. And joints are quickly made with the Transite Tapered Coupling that is engineered to stay tight in service.

For the full story of how Transite Ducts can reduce your cableway costs, write Johns-Manville, Box 60, New York 16, New York.

4 OTHER REASONS WHY TRANSITE DUCTS DO A BETTER JOB AT LESS COST:

1. Corrosion-Resistant. Transite, being made of inorganic asbestos and cement, resists corrosion and is immune to electrolysis.

2. Permanently Smooth Bore. Transite makes long cable pulls easy. Danger of damage to cables is also minimized.

3. Incombustible. Transite will not burn nor contribute to formation of smoke, gases, or fumes . . . confines burn-outs and protects adjacent cables permanently.

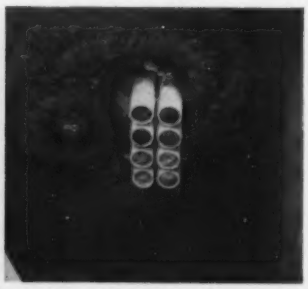
4. Higher Thermal Conductivity. Cables run cooler in Transite, reducing I^2R losses, increasing current capacity and prolonging insulation life.

Easy to Handle: Working in a deep trench, this man finds that the light weight of Transite Ducts helps him work without undue strain.

*Reg. U. S. Pat. Off.

Speeds Installation: Transite Ducts are joined so rapidly that the assembly man can often follow right behind the trencher . . . as shown in this installation.

Speeds Distribution: The light weight of Transite Conduit enables the contractor to haul a large number of ducts per truck and speed distribution on job site.



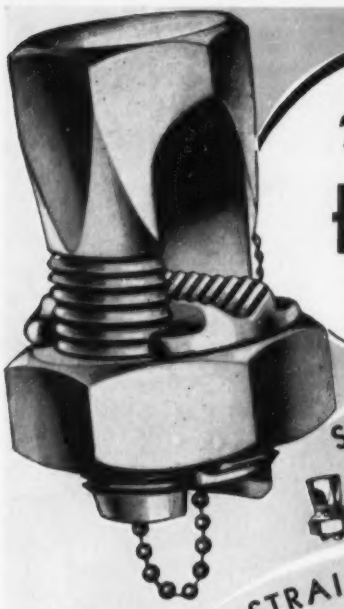
Cuts Manhole Costs: Concrete will be poured directly around these Transite Ducts to form the manhole wall, a time and material saving made possible by Transite's strength.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville TRANSITE DUCTS

TRANSITE KORDUCT—for installation in concrete

TRANSITE CONDUIT—for exposed work and installation underground without a concrete encasement



You can find the

EXACT FITTING

you need — in the

SERVICE CONNECTORS

STRAIGHT CONNECTORS

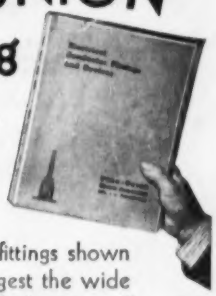
TEES

LUGS

GROUNDING CONNECTORS

and MANY MORE

PENN-UNION Catalog



The conductor fittings shown here can only suggest the wide variety. You'll find practically every good type, in a complete range of sizes.

New connectors are constantly being added - - so when you need a special fitting for an unusual service, tell us about it. Most likely we have exactly what you want.

Better design is a Penn-Union feature that you'll appreciate. For example, note the large gripping surfaces for wrenches, on the service connector shown in the upper left corner. When you use any Penn-Union fitting, you are sure that it is dependable - - mechanically and electrically.

Preferred by Leading Users, who have found that the "Penn-Union" mark on a connector is their best guarantee of unfailing service.

PENN-UNION ELECTRIC CORP.

ERIE, PA.

Northwestern Agencies
4130 First Ave. South
Seattle, Washington

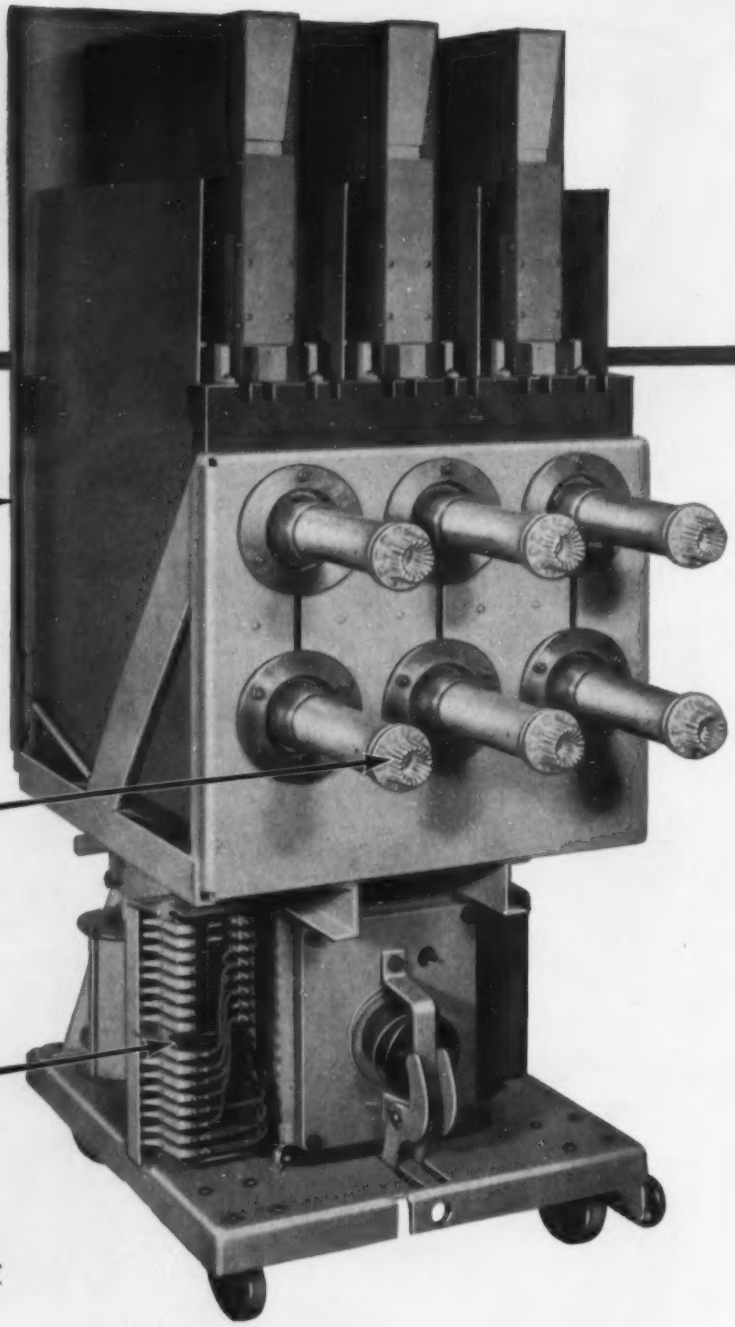
F. M. Nicholas Co.
714 Harrison St.
San Francisco

Kenneth Anderson Co.
412 Seaton St.
Los Angeles

The COMPLETE line of conductor fittings

PENN-UNION

ALLIS-CHALMERS
PROGRESS IN
Switchgear



Safety first! Steel panel in front completely seals off high voltage members

Primary contact fingers are on bushing of movable portion ...easy, safe to inspect

Secondary disconnects are direct-connected to auxiliary switches- eliminating wiring

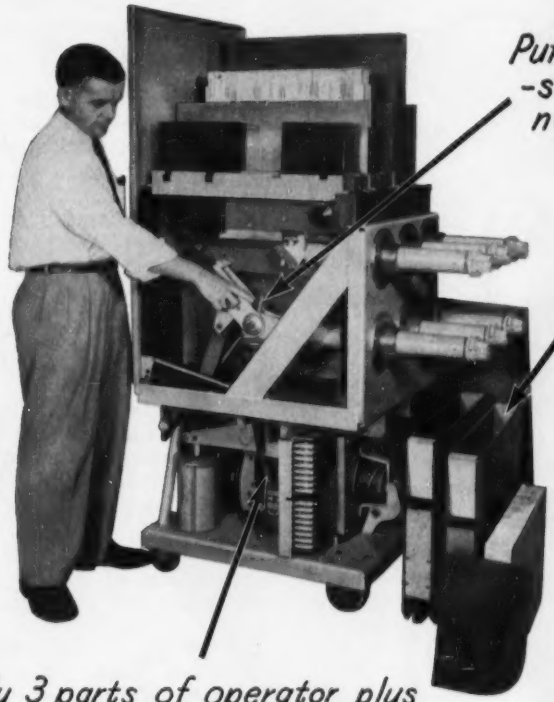
Shorter interrupting times for low currents

For additional information on this outstanding new breaker, call your nearby A-C district office or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-4175

ALLIS-

engineering notes on

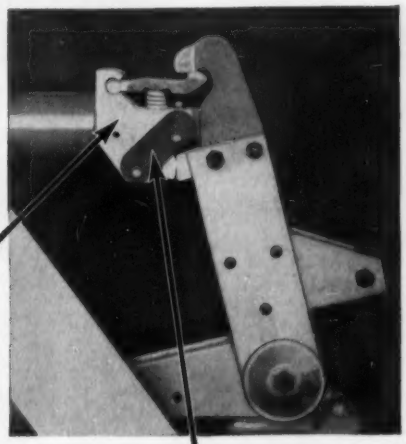
New 13.8-Kv Breaker



Puffer at ground potential -separately mounted- not on moving part

Each part of arc chute assembly is separately movable and can be conveniently handled by one man

Only 3 parts of operator plus armature move on closing operation; latch and trip-free link plus 3 parts of operator move during opening



Contacts are blow-on type. Magnetic field is arranged so that contact pressure increases as current increases

Access to contacts may be made by removing this insulated cover

CHALMERS

A-C ALLIS-CHALMERS

Equipment for Line Construction and Maintenance

via GraybaR

You can order all your heavy-duty equipment for pole line maintenance and construction from a single convenient source — makes and models known for their quality and reliability.

For example, if it's truck bodies you need, Graybar offers you all-steel units in various styles for construction, maintenance, and general service duties.

Winches and derricks? . . . We can match the right types of equipment to your needs — including models that will handle poles up to 70 feet in length.

For hauling cargo or poles, you can depend on Graybar for trailers and pole dinkeys that fit your needs exactly — whether your operations involve light- or heavy-duty service.

Perhaps right-of-way maintenance is your present concern. Let Graybar furnish your brush killer and spraying equipment. We can also recommend and supply the proper formulas for both dormant and growing season use.

Graybar provides a convenient, efficient source for procurement of all of your other pole-line needs, as well—poles, hardware, wire, strand.

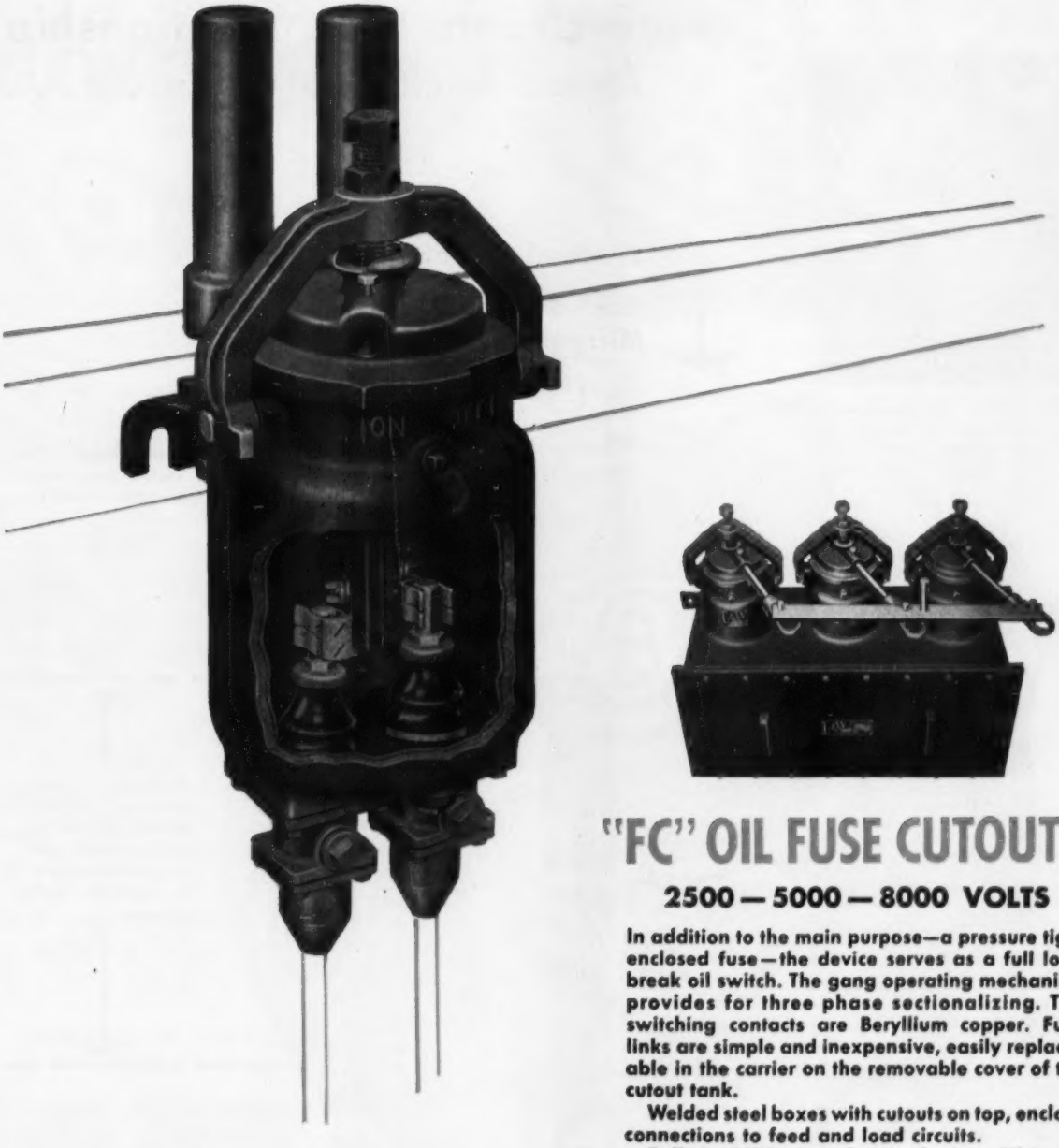
A single responsibility for everything you need . . . when you need it. *Graybar Electric Company, Inc. Executive Offices: Graybar Building, 420 Lexington Avenue, New York 17, N. Y.* 408-84

Call Graybar first for...

GraybaR Everything Electrical GraybaR ELECTRIC COMPANY

IN OVER 110 PRINCIPAL CITIES

CAST STEEL TANK (HERMETICALLY SEALED—OIL FILLED) PROTECTS MEN AND EQUIPMENT BY SAFELY WITHSTANDING HIGH PRESSURES OF HIGH VOLTAGE FUSE CLEARING A HEAVY SHORT CIRCUIT



"FC" OIL FUSE CUTOUTS

2500 — 5000 — 8000 VOLTS

In addition to the main purpose—a pressure tight enclosed fuse—the device serves as a full load break oil switch. The gang operating mechanism provides for three phase sectionalizing. The switching contacts are Beryllium copper. Fuse links are simple and inexpensive, easily replaceable in the carrier on the removable cover of the cutout tank.

Welded steel boxes with cutouts on top, enclose connections to feed and load circuits.

Bulletin CA52 gives data and prices. Write for a copy or ask your representative.

G&W "Forethought" CD1-5 shows how "FC" cutouts are combined with "RAL" oil switch. Send for your copy, there is no obligation.

G & W ELECTRIC SPECIALTY CO.

7780 Dante Avenue, Chicago 19, Illinois

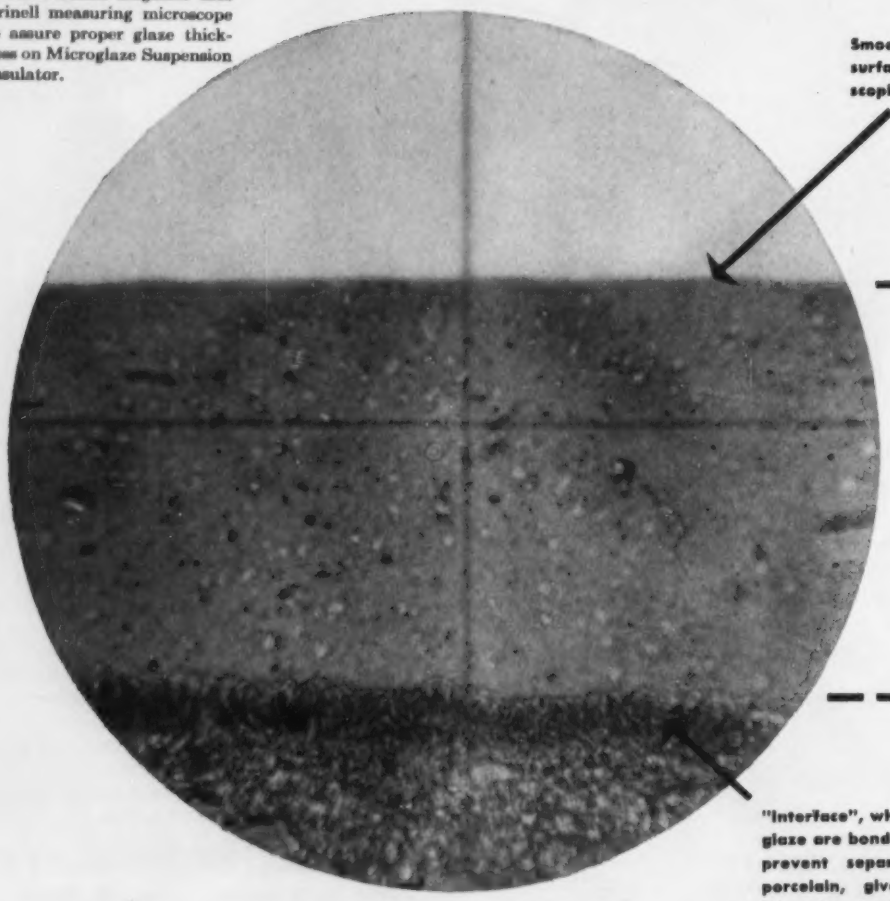
Cable Terminating, Connecting and Sectionalizing Devices
Representatives in principal cities of U. S. A.
In Canada—Powerlite Devices, Ltd., Toronto and Montreal

Locke reports new facts about GLAZE THICKNESS and

Research into their relationship leads Locke to develop . . .

Locke Ceramic Engineer uses Brinell measuring microscope to assure proper glaze thickness on Microglaze Suspension Insulator.

Photomicrograph of cross section near surface of Microglaze Suspension Insulator



Smooth, self-cleaning glaze surface results from microscopic glaze thickness control.

Thickness of glaze, measured between surface and junction with porcelain body is controlled by Locke to achieve peak strength.

"Interface", where porcelain body and glaze are bonded. Interlocking crystals prevent separation of glaze from porcelain, give added strength to Microglaze Insulators.

INSULATOR STRENGTH

NEW MICROGLAZE SUSPENSION INSULATORS

An insulator's ability to withstand mechanical impact varies with thickness of the compression glaze on its surface. Too much glaze . . . or too little . . . will prevent full development of insulator strength.

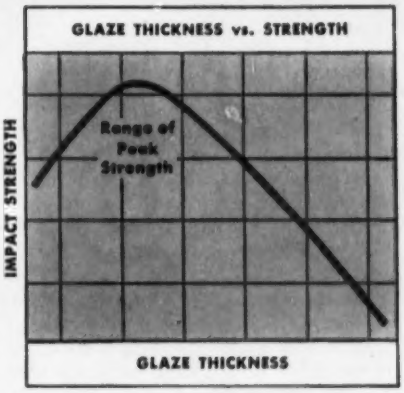
However, laboratory tests show that porcelain with a smooth coat of compression glaze, held within a microscopically narrow range of thickness, will be as much as 40% stronger than improperly glazed porcelain.

Locke has been quick to bring this discovery out of the lab and onto the production line for the benefit of all insulator users.

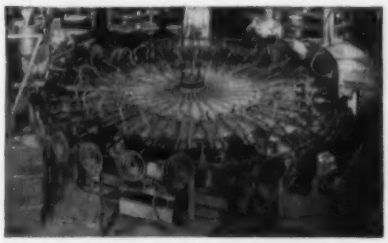
The result is the new MICROGLAZE Suspension Insulator.

Microscopic control of glaze thickness is now applied to these mass-produced suspension insulators, resulting in uniform peak strength, assuring you a new kind of protection . . . and longer, trouble-free insulator service life.

Next time specify MICROGLAZE Suspension Insulators . . . your best insurance yet against the hazards of mechanical impact.



Research in Locke laboratories proves definite relationship between glaze thickness and both flexural and impact strength of the porcelain. Curve shows how impact strength increases with increasing glaze thickness, reaches peak, then drops sharply. On Microglaze Insulators, glaze thickness is maintained within the narrow range which gives *peak* strength.



Accurate glaze thickness control is accomplished by use of this precision glazing machine. As each insulator spins its way around the wheel, it is cleaned, moistened, glazed, exactly the same way as every other. This, combined with special control of many other factors assures uniform appearance, uniform top strength, uniform reliability.

Send today for new 8-page folder titled "The Story of Microglaze Insulators"

LOCKE

LOCKE DEPARTMENT
GENERAL ELECTRIC COMPANY
BALTIMORE, MARYLAND

*Trademark of General Electric Company

PRODUCT NEWS

Straight Line Clamp

(1) Porcelain Insulator Corp., 761 Main St., Lima, N. Y.

This forged aluminum straight line clamp, Pinco L4491 FA, has a clamp body of drop forged aluminum alloy and a drop forged steel keeper with aluminum liner.

Designed to accommodate both ACSR and all-aluminum conductor with a cable seat range of .46 to .91 in., it has a rated ultimate strength of 15,000 lb.

It comes also in drop forged steel with ultimate strength rated at 12,000 lb (this model designated No. 4491). Cable seat is the same as forged aluminum model and will accommodate all conductors within its cable seat range.

Both models are equipped with a come-along eye and are available with socket- or clevis-type connectors. Slip strength with aluminum and copper conductors within size range is 5,000 lb.

Pole Bearing Plates

(2) Malleable Iron Fittings Co., Branford, Conn.

This new pole bearing plate is made of malleable iron and employs the principle of the cone anchor. It was designed to provide increased bearing values while improving resistance to up-lift.

A pair of pole bearing plates adds 180 sq in. of bearing area, according to the manufacturer. Reinforcing ribs check rotation and the cone effect resists up-lift, it is stated. The curved perimenter keeps pole hole size to a minimum.

The device is installed with a single through bolt and the manufacturer's Grid Gains. One or more pairs can be installed as necessary. They can be used at the ground line on existing structures to resist down-thrust, the manufacturer states.

Silicone Enameled Magnet Wire

(3) Anaconda Wire & Cable Co., Muskegon, Mich.

For use in electrical equipment operating at temperatures of at least 130 C, a new silicone enameled magnet wire has good abrasion resistance, adheres well to the conductor, is smooth, tough and is not attacked by common solvents, according to its manufacturer.

The enamel will not craze when exposed to solvents and will not crack when subjected to extremely low temperatures (minus 65 C). Dielectric strength is 1,500 v per mil. The manufacturer states that best results in windings will be secured by using silicone-treated Fiberglas insulators and silicone varnishes.

Wires insulated with the new enamel are furnished in single and heavy grades in the same dimensions as Formvar and nylon. The film is easily removed by chemical strippers such as those used for Formvar or by wire brushes, it is stated.

The wire has much the same appearance and feel of other synthetic resin-insulated wires. Color is reddish brown on thin-film wires; is darker in heavier grades. It may be handled and stored as other enameled magnet wires.

Screw Anchor Expander

(4) Greenlee Tool Co., Rockford, Ill.

This tool is claimed to set lead screw anchors rapidly and securely, regardless of thickness of the masonry. The hole in the wall does not have to be drilled to an accurate depth, according to the manufacturer, and can go through completely or partially. Setting of the anchor with reference to the surface of the masonry is always the same, provided the hole is drilled deep enough, it is stated.

The lead screw anchor is screwed on the expander, inserted into the drilled hole and the head of the expander is struck with hammer or mallet until the anchor is held secure in the wall. The expander is then unscrewed.

Striker and body of the expander are made of hardened alloy steel. The tool comes in three sizes.

Fill in Coupon on Page 70

Protect

YOUR LINEMAN
AS WELL AS
YOUR LINE WITH

BLACKBURN Aluminum FITTINGS

Time-Tested in Field Operation

NO HAZARDOUS TOOLS REQUIRED

When that storm emergency call comes through, linemen appreciate the easy, safe way they can install BLACKBURN Aluminum Fittings with their standard hand tools.

Engineers and operating men can specify BLACKBURN Aluminum Fittings with confidence because they:

- **Protect conductors, by distributing unit pressures over large area.**
- **Provide wide separation of dissimilar metals—insuring against galvanic corrosion.**
- **Are made with corrosion resistant alloys.**
- **Are time tested in field operation under all weather conditions.**
- **Available in varied designs as illustrated.**

Send for free literature and samples

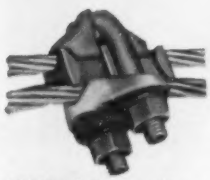
Available through electrical wholesalers everywhere

JASPER BLACKBURN CORPORATION

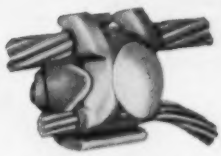
35 Madison St. • St. Louis 6, Mo. • *Phone:* CEntral 3007

TYPE PAA-400
For Aluminum Conductors through 400 MCM

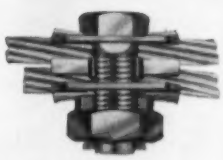
TYPE PAC—For Aluminum Conductors through 336.4 MCM; Copper through 2 str.



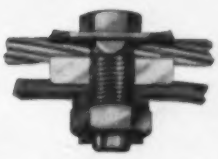
TYPE DLC—For Aluminum Conductors through 1/0 ACSR



TYPE PAA—For Aluminum Conductors through 336.4 MCM



TYPE AAW—For Aluminum Conductors through 4/0 ACSR



TYPE CA—For Aluminum Conductors through 4/0 ACSR; Copper through 4/0

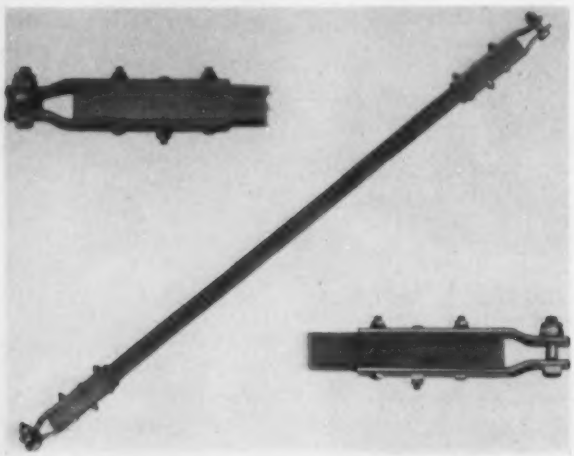
Screw Anchor Tool

(5) Petersen Engineering Co., Santa Clara, Calif.

This power-driven screw anchor tool is designed to slip over the pilot of any size Pengo auger as used on heavy-duty earth boring machines. The eyes of all leading makes of screw or swamp anchors will slip over the other end of the fitting and any size of anchor can thus be screwed into the ground in a minute or two, according to the manufacturer.

Advantages claimed are that it is unnecessary to remove the auger; that there is nothing to remove from the boring machine; that the fitting is small and light and can be placed over the pilot bit with one hand. When the anchor is screwed in, the tool slips off the pilot and is carried on the truck until it is needed again. It is nearly indestructible, the manufacturer states.

A similar tool for use on Tel-E-Lect and other makes of A frame type diggers is in production.



Guy Insulators

(6) Line Material Co., Milwaukee 1, Wis.

Mora instead of Douglas fir is used in these new wood guy insulators. Mora is described as a tropical wood having unusual density and resistance to decay, fire and moisture absorption. It has demonstrated its high mechanical and electrical strengths under laboratory tests, the manufacturer states. Because of the wood's resistance to fire and moisture absorption, the new insulators have been designed without arcing horns and are said to be neater and safer.

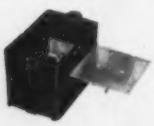
New insulators are available with ultimate strengths of 15,000, 25,000 or 35,000 lb in several voltage classes. The 15,000-lb units are made for voltage classes 23 through 69 kv; 25,000-lb models for 23-161 kv; 35,000-lb for 69-161 kv. The 35,000-lb insulators have two rollers side by side at one end; the 15,000- and 25,000-lb units have a single roller.

Each mora guy insulator is designed to give an impulse strength about twice the BIL of its rated voltage class.

(7) NEWLY DESIGNED TRAILER for transportation and storage of hot-line maintenance tools is lighter in weight; has improved roadability and increased rack space, according to its manufacturer, the James R. Kearney Corp., 4236 Clayton Ave., St. Louis 10, Mo. It has four bins for accessories and its rubber- and felt-padded racks accommodate 12-ft poles. Floor and sides are steel. The counterbalanced aluminum alloy lid is hinged at the front to allow unobstructed access on three sides. The trailer is 215½ in. long; 68 in. wide. Closed height is 49½ in.; empty weight, 1,550 lb

Switch Box

(8) Union Insulating Co., P. O. Box 351, Parkersburg, W. Va.



The No. 9000-F front-mounting nail-up switch box is for wet walls. Its Plaster-Seal keeps plaster from device screw holes. Thin molded flash is easily removed with a screwdriver, the manufacturer states.

The front-mounting bracket instantly locates box for depth with front-of-stud nailing. One nail driven in face of stud mounts box rigidly.

This box is not designed to be used as a wing bracket box; works best when it is placed flat against or not more than ½ in. away from stud, the announcement states.

Bracket is offset 5/8 in. The box takes long bodied devices.

Outage Monitor

(9) Sprague Electric Co., North Adams, Mass.

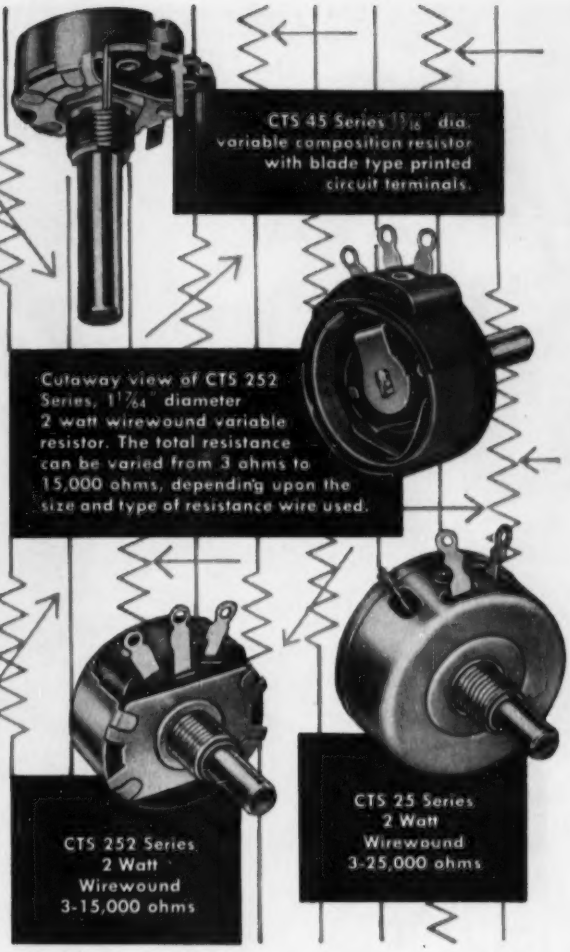
The recently developed Moduline outage monitor is claimed to permit a simultaneous monitoring of up to 50 separate circuits on a power system with the use of only one carrier frequency. According to the manufacturer, it is economically feasible for use on distribution as well as on high-voltage feeder and transmission lines. Bulletin MD-7000 gives details.

"DRIVER-HARRIS ALLOYS

have contributed greatly in making our performance possible"

says

CHICAGO TELEPHONE SUPPLY *Corporation*


CTS 45 Series 1 5/16" dia. variable composition resistor with blade type printed circuit terminals.
Cutaway view of CTS 252 Series, 1 7/64" diameter 2 watt wirewound variable resistor. The total resistance can be varied from 3 ohms to 15,000 ohms, depending upon the size and type of resistance wire used.
CTS 252 Series 2 Watt Wirewound 3-15,000 ohms
CTS 25 Series 2 Watt Wirewound 3-25,000 ohms

Chicago Telephone Supply Corporation has succeeded in accomplishing two things indeed difficult to combine, as summed up in their slogan "Specialists in Precision Mass Production of Variable Resistors." They manufacture the high quality variable resistors indispensable to radio, television, and military electronics. In fact, they are the world's largest producers of variable resistors.

To achieve this outstanding record, they concentrate their entire effort on variable resistors, they maintain close control over all manufacturing processes, and fabricate their own parts under close supervision from basic raw materials. Naturally, they make no secret of the importance to them of high quality materials.

States Chicago Telephone: "To make our raw material program effective, we have stressed the importance of dependable, quality-minded sources of supply. Driver-Harris is a supplier with these qualities, *and Driver-Harris alloys have contributed greatly in making our performance possible.* For many years we have been using Driver-Harris Nichrome*, Karma*, Advance*, and other D-H Alloy wires for our resistance windings, with excellent results. We can strongly endorse Driver-Harris' dependability and high quality products."

Nichrome, Advance, and Karma are at your service too, as are more than 80 other D-H alloys developed for application in the electrical and electronic fields. If a high degree of resistance and absolute uniformity of output are "musts" for *your* product, let us have your specifications. We'll be glad to make recommendations based on your specific requirements.

*T.M. Reg. U.S. Pat. Off.

Sole producers of Nichrome, Advance, Karma

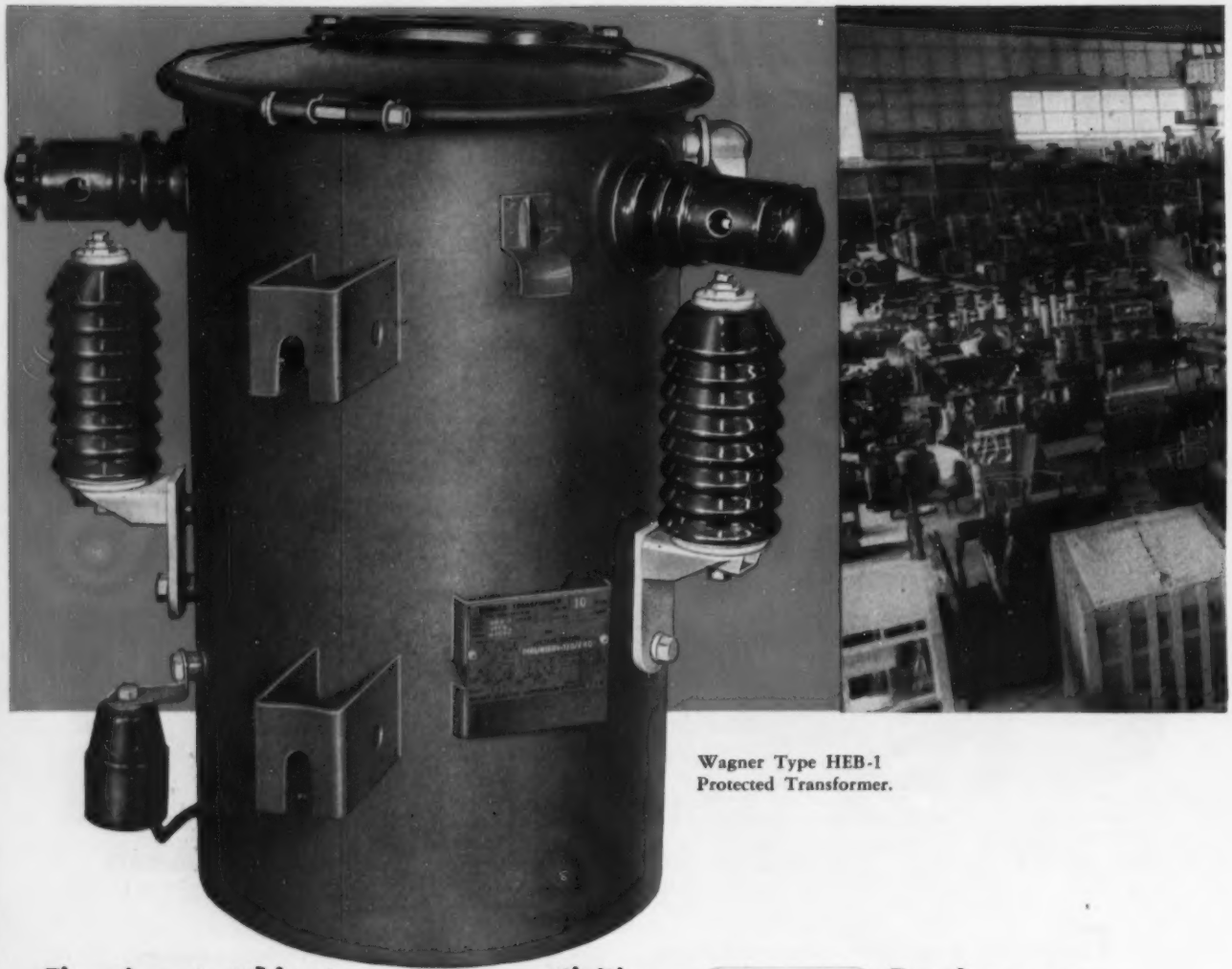
Driver-Harris Company

Western Representative: **ANGUS-CAMPBELL, INC.**

5320 Santa Fe Ave., Los Angeles 58 917 Bryant St., San Francisco 3

Main Office and Plant: HARRISON, NEW JERSEY

MAKERS OF THE MOST COMPLETE LINE OF ELECTRIC HEATING, RESISTANCE, AND ELECTRONIC ALLOYS IN THE WORLD



Wagner Type HEB-1
Protected Transformer.

These Important Advantages are yours with Wagner Form W Transformers

HIGH VOLTAGE SIDEWALL BUSHING

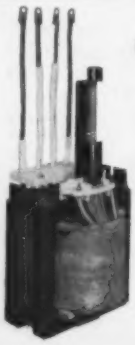
Now you can make faster, easier, safer, permanent connections. Conductor slips into connector—no special tools are needed—and connector can be tightened by turning the insulated finger-grip knob.

PRE-SET LINE TO ARRESTER ISOLATING GAP

This design incorporates a bushing and arrester assembly that occupies minimum tank space and provides permanent connections with the arresters isolated from the line.

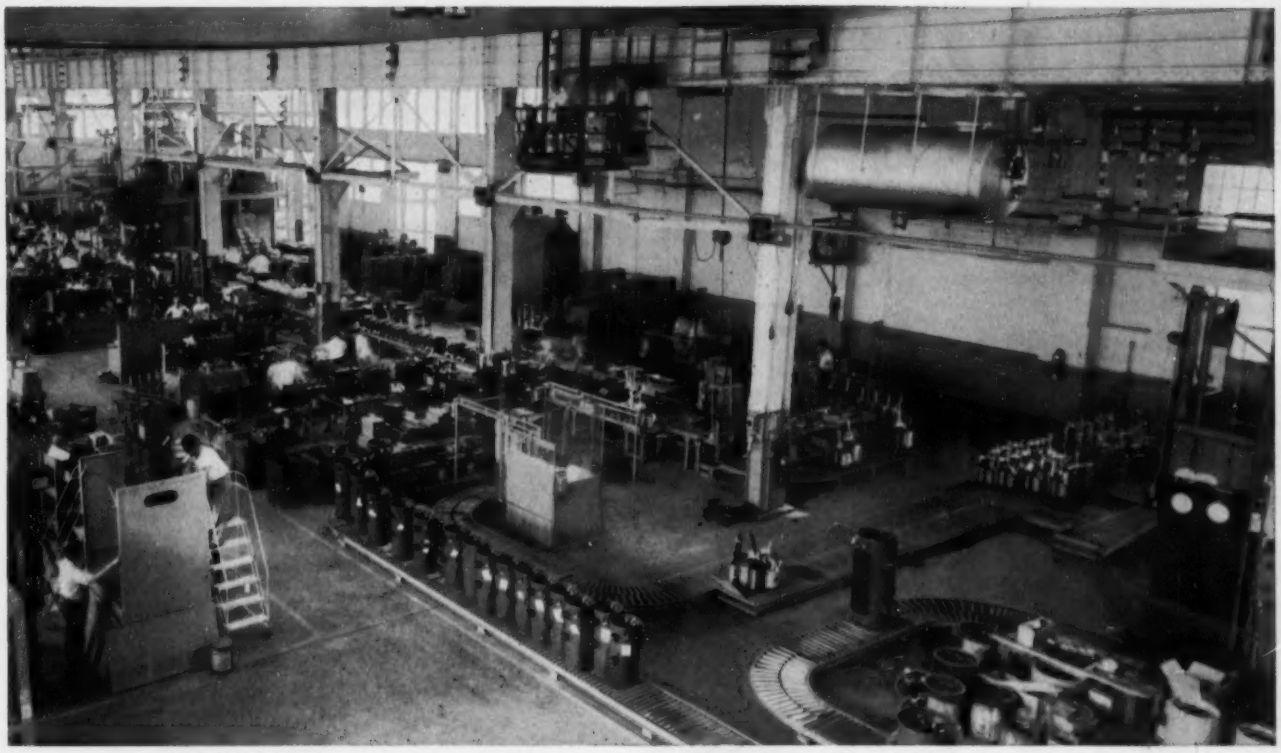
SHUR-SEAL CLAMPED COVER

You get actual sealed-tank construction with cover sealed to the tank with the Wagner SHUR-SEAL Clamping Ring. "Breathing" is completely prevented. No oil can be lost during shipment or handling.



FORM W CORE AND COILS

Wagner Form W Construction, with preformed cores of cold-rolled, oriented grain steel, permits a liberal design in small size, light-weight transformers that give excellent electrical performance.



New Wagner Plant Speeds Production of Form W Distribution Transformers

Now, Wagner's expansion program provides a new plant, devoted exclusively to the manufacture of transformers, that will help speed production of Form W Distribution Transformers to meet the demand created by the nation's growing power load.

Form W Transformers are exactly right for modern distribution systems. Their small size and light weight makes them easy to handle — to store — to mount on poles. They are available in ratings up to 167 kva, with protective devices to meet any need.

Choose Form W Transformers for your next installation—they pay dividends in longer service life.

Wagner maintains a nationwide organization to provide fast, convenient service, with branches in 32 principal cities.

Wagner's complete line of distribution transformers includes every rating and design listed in the E.E.I.-NEMA Fifth Report. Choose Wagner and get the benefit of improved design, quality construction and high efficiency with *standardized* mechanical features in ratings of 500 kva and below. Bulletin TU-180 gives complete information on Wagner Distribution Transformers. Write for your copy today.

Wagner Electric Corporation EST. 1891

WAGNER ELECTRIC CORPORATION
6381 Plymouth Ave. • St. Louis 14, Mo., U. S. A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

T54-5

● Wherever motor and generator brushes are used in this nation, you will find "OHIO'S" products among the leaders in the field in performance. There is a reason for this!

It is our policy to firmly believe—"That the most important part of a motor or generator is the brush. Properly designed brushes will give you proper commutation, *increase* motor efficiency and performance, and will *minimize* maintenance costs." Consequently, the reputation for EXCELLENCE that OHIO products have achieved is due to expert engineering and modern methods of production. REMEMBER:—OHIO brushes represent a tiny *investment* that pays giant *dividends*.

ORDER YOUR CARBON BRUSHES FROM A SINGLE SOURCE

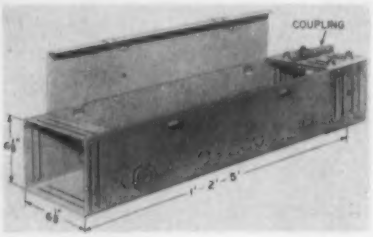
West Coast Representative
C. F. BOWERS
544 S. San Pedro St.
Los Angeles 13, Cal.

THE OHIO CARBON COMPANY
12508 BEREA ROAD • CLEVELAND 11, OHIO

Welding Helmet

(10) General Electric Co., Schenectady 5, N. Y.

A new seamless plastic welding helmet, claimed to be light weight and strong, incorporates the manufacturer's standard ventilation design. The plastic shell is heat-resistant, moisture-proof and nonwarping. This headgear is designed to fit any head. A ratchet-type device gives wider-range headsize adjustment and a four-position stop meets vertical and overhead needs. It comes in black finish with or without flip front. The models weigh 29 and 25 oz respectively.



Raceway

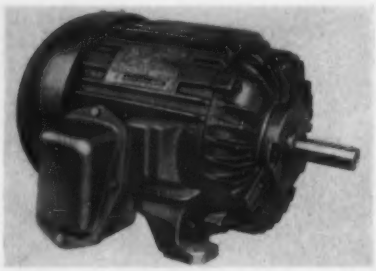
(11) National Electric Products Corp., Gateway Center, Pittsburgh, Pa.

A new wireway and auxiliary gutter, 6x6 Wirewa, is claimed to give unusual flexibility of distribution and to permit relocation of electrically powered equipment at lower cost. It comes in lengths of one, two and five feet. Various fittings for T, L and cross-over and junction boxes are being manufactured.

The raceway is die formed from .078 steel and finished in baked grey enamel. For use in corrosive locations it is made of galvanized steel, finished in baked grey enamel. It has all features of the manufacturer's standard 4x4 Wirewa.

(12) PAINT — Applications in industry are seen for a new paint in which the principal ingredient is aluminum. Offered in seven shades, the Opal-Glo paint is said to combine durability, high light reflectivity and coverage of standard aluminum paint with pleasing, gentle colors of conventional wall paints. Alcoa aluminum is used in the paint, which is made by Sherwin-Williams Co. Details may be secured from Aluminum Co. of America, 721 Alcoa Bldg., Pittsburgh 19, Pa.

(13) PEN LIFTER — An automatic pen-lifting device has been designed for single-record strip chart recorders by the Industrial Division of Minneapolis-Honeywell Regulator Co., Wayne and Windrim Ave., Philadelphia, Pa. A special rod and lever arrangement, operated by a solenoid, raises the pen clear of the chart depending on the requirements of the application.



New Design

(14) Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Initially available in frame sizes 182 and 184, the manufacturer's new line of a-c squirrel-cage induction motors in frame size 326 and smaller follows the newly established NEMA standards.

Stating that the redesign means equal horsepower in a smaller package, company engineers pointed out that the new type G motors will retain all important features of the AP line and offer improvements inherent in the redesign. For instance, under the new standards, the 5-hp, 1,800-rpm general-purpose drip-proof squirrel cage motor will meet the same standards as the former design but will be built on the 215 instead of the 254 frame. None of the performance standards will be altered, it was stated, and performance in the rerated frames will be within the limits of present values.

Efficiency and power factors of the new motors may change slightly from the values obtained in present designs but the product of efficiency and power factor will remain relatively the same, according to the engineers.

The new motors will be similar to present designs in appearance. Constructionwise, the new models will have cast-iron frames and end shields. Rotors will be pressure-cast of aluminum. Bearings will be grease-lubricated medium-series double-shielded ball bearings, capable of relubrication without dismantling the motor. Stator windings will be the random or mush wound type of heavy Formvar-coated wire in semiclosed slots. Stator will receive multiple dips and bakes to assure protection against moderate amounts of moisture, weak acids and alkalies.

Intake openings in the end shields of the new type G open motor will have far greater protection than in the old design, it was pointed out.

Illustrated is the 5-hp 220/440-v three-phase 60-cycle 1,740-rpm type-GZ-frame 215 totally enclosed fan-cooled standard motor.

(For More Data, Use Coupon, Page 70)

New RPM Automotive Grease Does the Work of 4 Special Greases

Proved in the field in heavy-duty equipment, RPM Automotive Grease fully protects wheel bearings, chassis bearings, universal joints and water pumps, as well as fifth wheels and many other greased bearings. You can save time, work and money by using this stable multi-purpose grease. It stays in bearings and maintains proper consistency even when units operate in mud, water, freezing cold or extreme heat!

SAVES TIME! RPM Automotive Grease simplifies and speeds up lubrication jobs . . . no stopping to change guns . . . no lost time explaining complicated lubrication procedures to employees.

SAVES WORK! With RPM Automotive Grease, you have only one gun to fill . . . one gun to keep clean, in place of four. With only one grease container to move, you save work and space in the oil house.

SAVES MONEY! RPM Automotive Grease saves many dollars in lubrication time, cuts repair expense by preventing use of wrong type grease. You buy only one grease, need only one grease gun, lose less grease from waste and contamination.

EXCLUSIVE, CONVENIENT PACKAGING

RPM Automotive Grease is available in a new, exclusive 12-ounce grease cartridge in addition to the usual containers. The RPM Grease Cartridge ends waste, speeds loading, prevents smears on your hands, clothes and grease gun. Just slit the top, drop cartridge into gun, replace pumphead. These sealed cartridges prevent contamination of grease, end grease storage and handling problems, convert a messy job into a simple, clean operation!

RPM

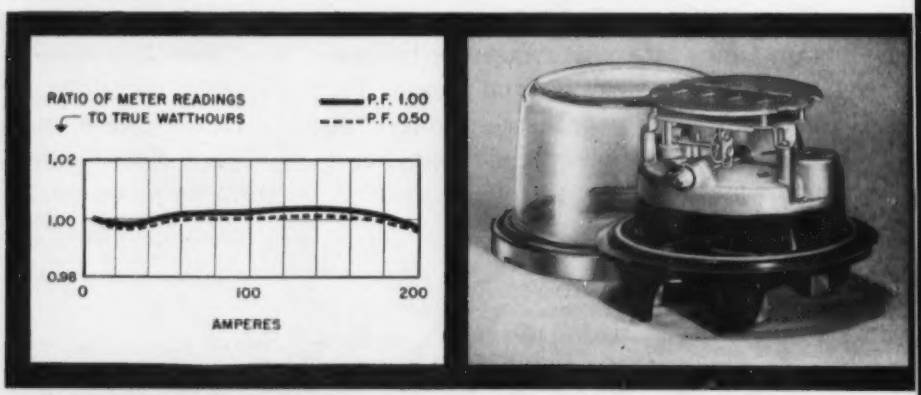
Try RPM Automotive Grease today! Give yourself the benefits of this proven multi-purpose grease . . . call your Standard Fuel and Lubricant Engineer or Representative now for full information, or write Standard Oil Company of California, 225 Bush St., San Francisco.

STANDARD OIL COMPANY OF CALIFORNIA

NEW

General Electric
Type I-50 watthour meter,
rated 50 amperes

NEWEST MEMBER of the General Electric I-50 family, the 50-ampere I-50 watthour meter has performance characteristics comparable to the proven 15-ampere I-50. Newly designed current coil construction and light-load plate assure greater accuracy.



1 **STRAIGHT-LINE ACCURACY** up to 200 amperes, as shown in these load curves, means greater stability and dependability in all applications of this new G-E meter.

2 **UNIT CONSTRUCTION** of new 50-amp I-50 helps assure inherent high accuracy over many years, reduces testing and repair expense.

✻ **FOR A SAMPLE DEMONSTRATION** of the new General Electric 50-ampere I-50 watthour meter, newest member of the growing I-50 family, or for more information, contact your nearest G-E apparatus representative, or write: Section 601-103, General Electric Co., Schenectady 5, N. Y.

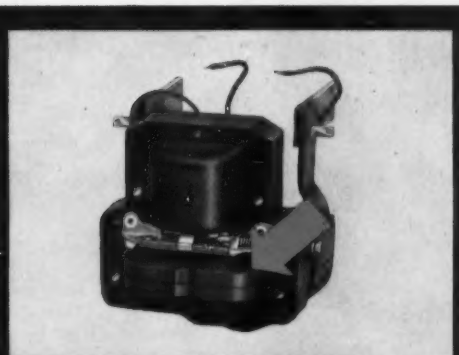
50-ampere I-50 watthour meter—

Another new member of the I-50 family

5 REASONS WHY THIS

NEW G-E METER*

WILL LOWER YOUR METERING COSTS



3 **MAGNETIC SUSPENSION SYSTEM,** identical to the 15-amp I-50's "floating disk," eliminates bearing wear, keeps maintenance cost to minimum.

4 **COMPLETELY NEW STATOR** design with butyl-molded current coil assembly (arrow) eliminates possible changes in calibration, assures consistent, high insulation level.

5 **NEW 50-AMPERE METER** incorporates all the proven features of the 15-amp I-50 meter to bring you greater dependability and accuracy.

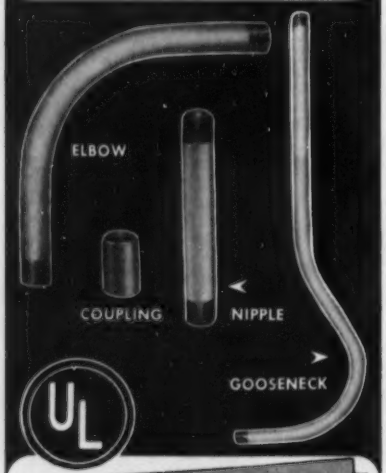
GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

Controlled quality in every operation makes Efcor FITTINGS best!

All EFCOR Electrical Fittings undergo a series of rigorous gauging tests to insure trouble-free performance under all conditions.

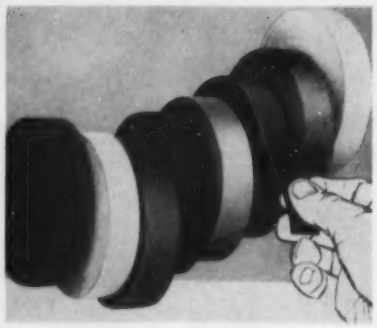
EFCOR manufactures a complete line of quality fittings, made of malleable iron or steel, for every type of installation.



Efcor MAKES "THE BEST CONNECTIONS"

SOLD THROUGH ELECTRICAL WHOLESALERS ONLY

Efcor ELECTRICAL FITTINGS CORP.
Dept. W-16
Woodside 77, New York



Color Tapes

(15) Van Cleef Bros. Inc., Division of Johns-Manville, 7800 Woodlawn Ave., Chicago 19, Ill.

A new line of Vinyl plastic tapes comes in eight colors; is UL listed. The manufacturer suggests its use in electronic assemblies, indexing, coding, packing, industrial decorating, etc.

These tapes are said to have excellent adhesive qualities and high resistance to the average destructive elements. They are available in four widths: ⅜, ½, ¾ and 1 in. Colors are red, yellow, green, blue, gold, silver, black, white.

Insert

(16) Unistrut Products Co., 1013 W. Washington Blvd., Chicago 7, Ill.

Designed for quick suspension of piping, electrical conduit, heating and ventilating ducts, a new spot concrete insert will take any square or hex head nut, bolt or hanger up to ½ in. and will support up to 1,000 lb.

The centered side holes take reinforcing rods up to ⅜ in. In addition drilled holes are provided for quick nailing into wood forms. Other features listed include a keyhole slot that permits 2-in. hanger adjustment for perfect alignment, special V-slots at either end for easy lining and centering.

Specifications: length, 4 5/16 in.; width, 2¼ in.; height, 1⅝ in.; keyhole slot entrance, 29/32 in. wide, ⅝ in. long; keyhole slot measure, 17/32 in. wide, 2 in. long; weight, .54 lb. The material is 12-gage cold-rolled steel. Standard inserts are unfinished but they may be secured in greenamel or galvanized. Load capacity is 1,000 lb in average good concrete with a safety factor of three.

Bulletin SI-1 gives details.

One-Ton Hoist

(17) A. B. Chance Co., Centralia, Mo.

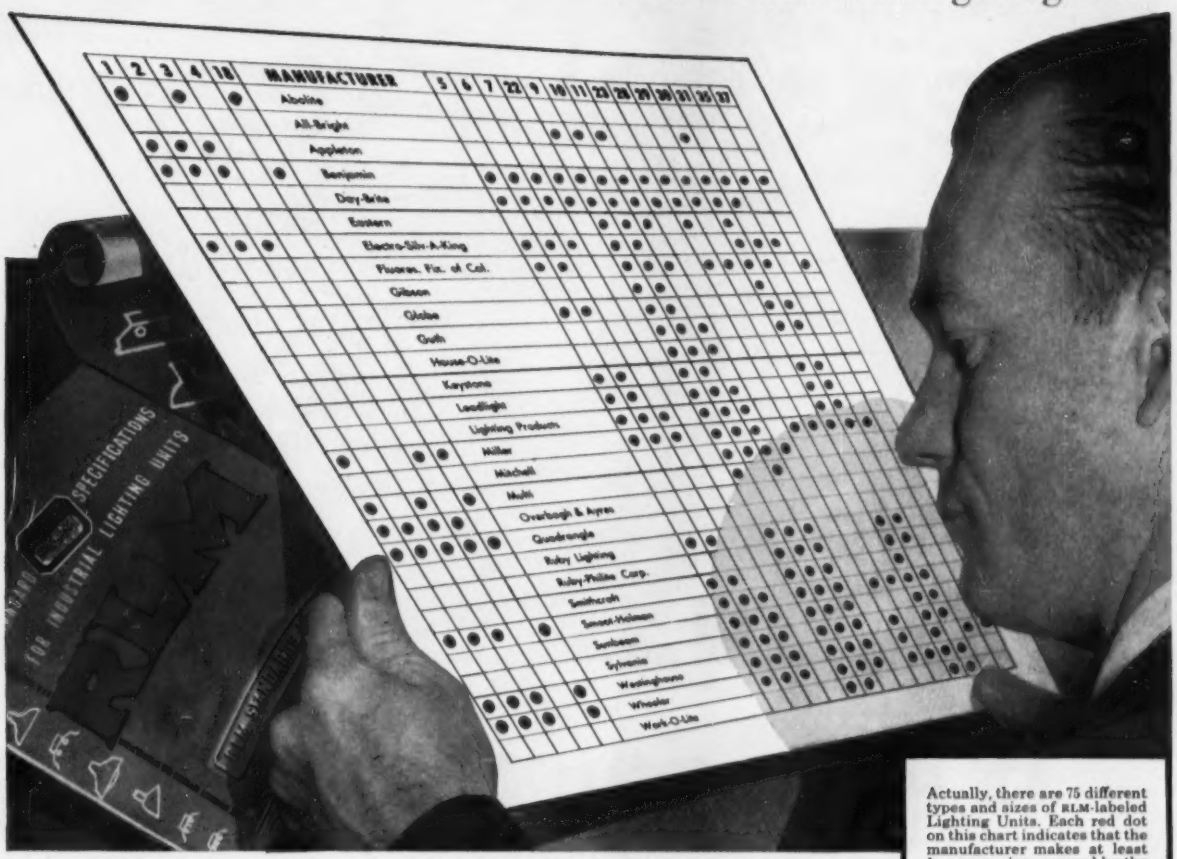
This chain-type hoist, rated to lift loads up to one ton, was designed for line construction and maintenance jobs. Housing and handle are made of aluminum with a hardened steel shaft.

According to the manufacturer, controls can be worked easily by linemen without removing heavy work gloves or rubber gloves. The chain is placed in "free wheeling" by flipping a control lever, which locks automatically when the hoist is pulling a strain so that a load cannot be dropped accidentally.

The hoist has a flexible steel load chain that will not kink or uncouple. The chain can be operated with either half-link or full-link take-up. All working parts are completely enclosed in the housing to prevent finger injuries.

(18) SQUARE SPOOL — Available on new square spools are braided and stranded copper cables made by Belden Mfg. Co., 4647 W. Van Buren, Chicago, Ill. Belden bulletin 7600 gives specifications of the line.

Here are your answers to 2 IMPORTANT QUESTIONS about Industrial Lighting Units



Actually, there are 75 different types and sizes of RLM-labeled Lighting Units. Each red dot on this chart indicates that the manufacturer makes at least 1 or more sizes covered by the particular RLM Specification.

Key to Spec. Nos.:

INCANDESCENT UNITS:

1. Dome (100-1000w)
2. Deep Bowl (100-1000w)
3. Sym. Angle (100-1000w)
4. High Bay (500, 1000w) Porcelain Enameled
18. Glassteel Diffuser (200-1000w)
40. High Bay Aluminum (500, 1000w)

FLUORESCENT UNITS:

Closed-End Reflectors:

5. 2-40w lamps, 48"
6. 3-40w lamps, 48"
7. 2-85w lamps, 60"
22. 2-40w w/shield, 48"

Open-End Reflectors:

9. 2-40w lamps, 48"
10. 3-40w lamps, 48"
11. 2-85w lamps, 60"
23. 2-40w w/shield, 48"
28. 2-58w, 72"
29. 3-58w, 72"
30. 2-75w, 96"
31. 3-75w, 96"

Semi-Direct Units:

35. 2-40w, 48"
36. 2-58w, 72"
37. 2-75w, 96"

Chart as of Jan. 1, 1954

1 WHY are RLM Specifications Important to me?

ANSWER: RLM Specifications furnish you with basic, nationally-accepted minimum standards of efficiency, design, performance and quality in industrial lighting equipment. This latest-edition 52-page RLM Specifications Book puts all 21 RLM Specifications at your fingertips, complete with coefficient of utilization tables and candlepower distribution curves. In addition, there are four pages of reasons why RLM Specifications are important to everyone who buys, sells or specifies industrial lighting equipment. Send for your COMPLIMENTARY COPY of the RLM Specifications Book ... there is no obligation!

2 WHO makes RLM-Labeled Units I want to Specify?

ANSWER: As shown by this chart, which is also included with the RLM Specifications Book, there are 29 different manufacturers who make RLM-labeled lighting equipment. Each RLM Unit must conform to the minimum performance and quality standards required by RLM Specifications. However, every manufacturer is free to incorporate his own special features, construction refinements and operating advancements — such as sockets, control equipment, wiring, etc. Send for your FREE RLM Book for more details. RLM Standards Institute, Suite 815, 326 West Madison Street, Chicago 6, Illinois.

RLM STANDARDS INSTITUTE
INCORPORATED

The letters RLM stand for Reflector and Lighting Equipment Manufacturers

MANUFACTURER'S NAME
COMPLIANCE WITH
SPECIFICATIONS
RLM
ELECTRICAL TESTING
LABORATORIES, INC.

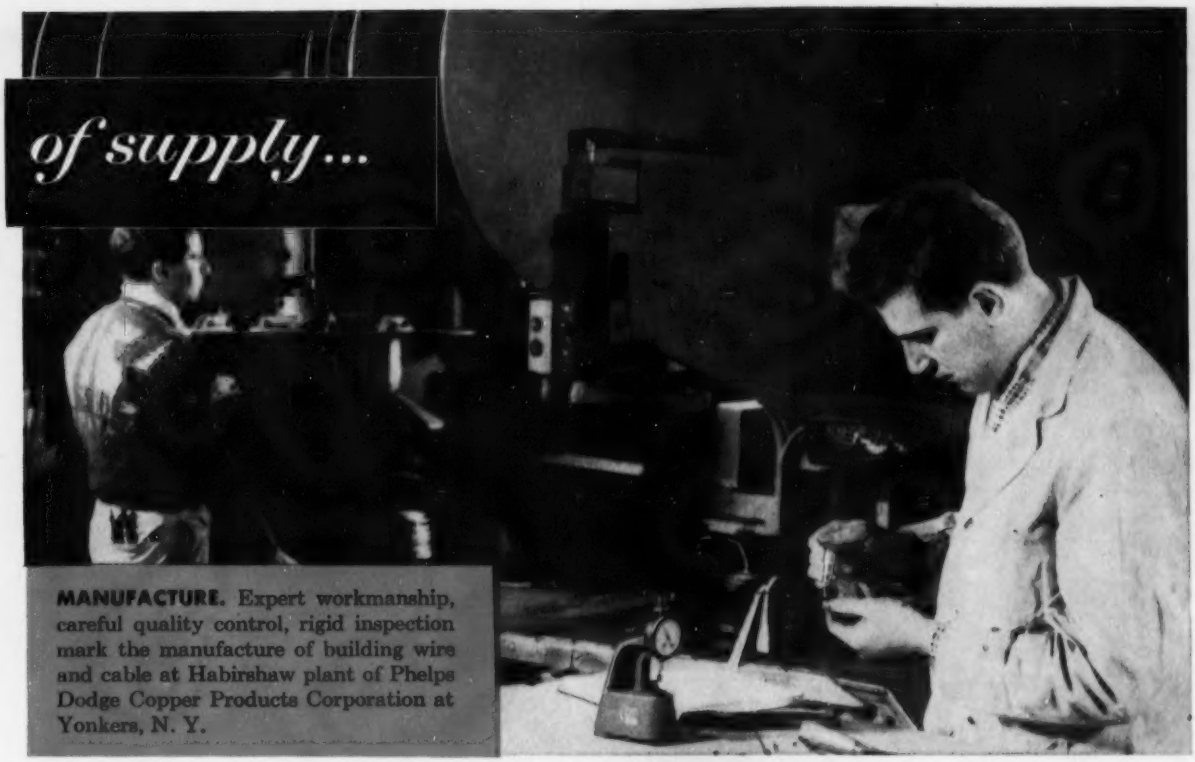
R168

When you need a dependable source

MINE. Habirshaw building wire and cable start in vast Phelps Dodge open-pit copper mines like this one at Morenci, Arizona.

IT PAYS TO SEE A PHELPS

MARKET. Delivery of Habirshaw building wire and cable by Phelps Dodge distributors to job site is final step in unified "Mine to Market" operation.



MANUFACTURE. Expert workmanship, careful quality control, rigid inspection mark the manufacture of building wire and cable at Habirshaw plant of Phelps Dodge Copper Products Corporation at Yonkers, N. Y.

DODGE DISTRIBUTOR!

Phelps Dodge's complete "Mine to Market" program assures distributors dependable supplies and service

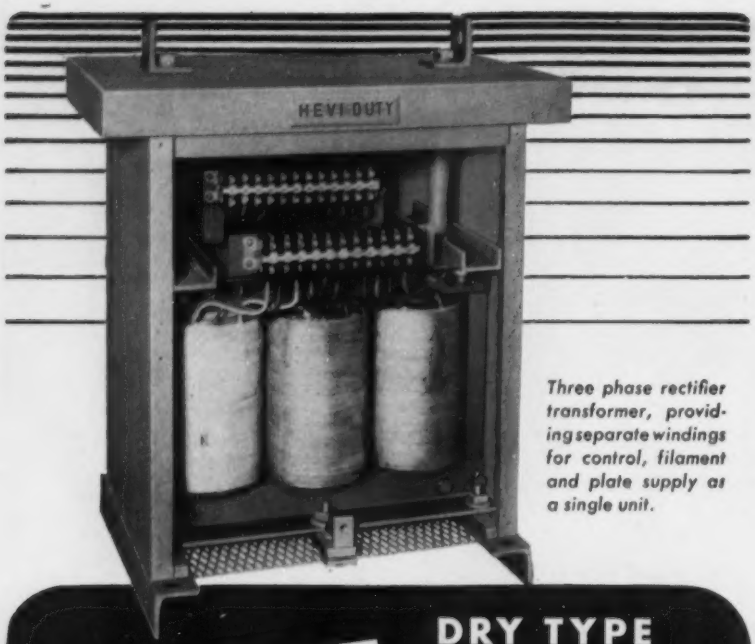
Here's what "Mine to Market" means to you:

1. ***A CONSTANT SUPPLY OF RAW MATERIALS.***
2. ***HIGHEST QUALITY WORKMANSHIP.***
3. ***PROMPT DELIVERY—all from one major source.***

Phelps Dodge distributors are an integrated part of this system, profit from working closely with a primary copper producer and fabricator.

PHELPS DODGE COPPER PRODUCTS CORPORATION

WIRE BY PHELPS DODGE MEANS WIRED FOR LIFE!

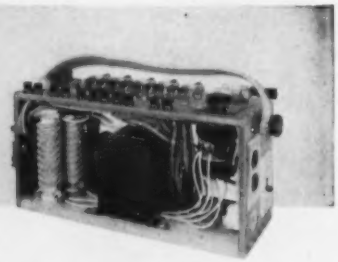


Three phase rectifier transformer, providing separate windings for control, filament and plate supply as a single unit.

DRY TYPE
HEVI DUTY® *Specialty*
TRANSFORMERS

Here are three typical examples of transformers that have been designed by Hevi Duty engineers for specific applications. Whether your needs are large or small for either standard or special transformers, you can depend on the engineering skill and modern manufacturing facilities of Hevi Duty Electric Co. to serve you.

Open type three phase insulating transformer for installation in control center cubicles. Primary voltages to 15 KV are available.



Hevi Duty, 3 KVA type SIO transformer is part of a portable test box used by electric utilities for testing protective relays in the field.

HEVI DUTY ELECTRIC COMPANY

MILWAUKEE 1, WISCONSIN

Heat Treating Furnaces... Electric Exclusively
Dry Type Transformers *Constant Current Regulators*

West Coast Plant — 15026 Oxnard Street — Van Nuys, California

Watt-Hour Meter

(19) General Electric Co., Schenectady 5, N. Y.

The I-50 universal watt-hour meter incorporates design features of the standard I-50 model. It permits conversion to be made in the field from a two-wire 120-v circuit to a three-wire 240-v circuit or vice versa. Only tool needed is a screwdriver and the conversion can be done in approximately one minute, the manufacturer states.

Heating Control

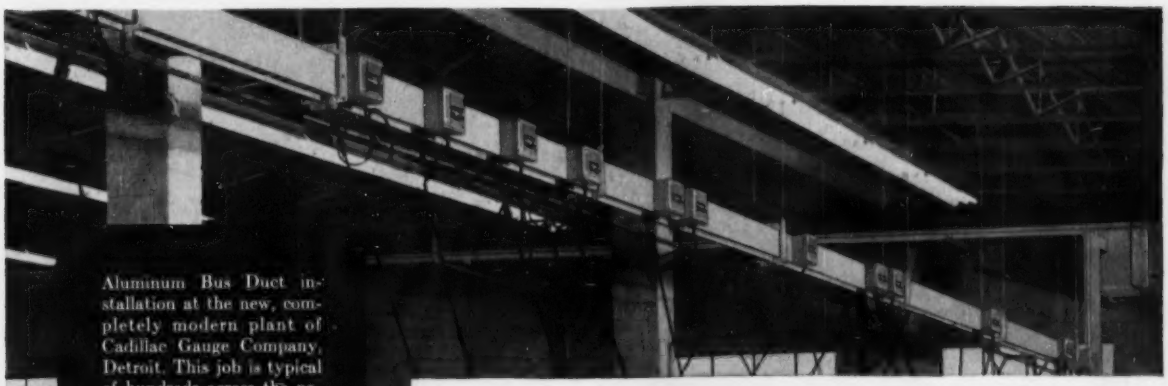
(20) Tork Clock Co. Inc., Mount Vernon, N. Y.

Called Weather Control, this new unit for regulating building heat is a combination of an inside control panel and an outside weather head. This unit automatically performs the duties of watching and recording outside weather, inside temperature, sun effect, wind velocity, hot water supply, chimney draft.

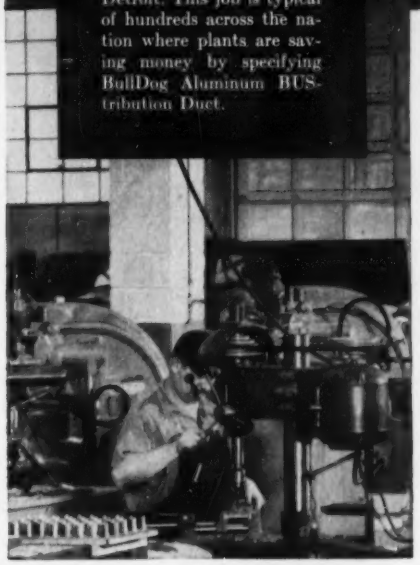
According to the manufacturer, the unit times heat to the weather and synchronizes heat output to the actual demands of the weather. Heat is cycled on the inside control panel according to outdoor temperature and indoor building satisfaction; the weather control starts and stops the heating plant at preselected intervals as programmed on the 24-hour dial. Panel signal lights indicate proper and current operation to attendants.

For summer use, the off position allows the system to provide hot water without building heat. An omitting device for automatically skipping days on which building may be closed is optional. The unit, for line voltage only, is available in 115 v, 60 cycles and 208-230 v, 60 cycles.

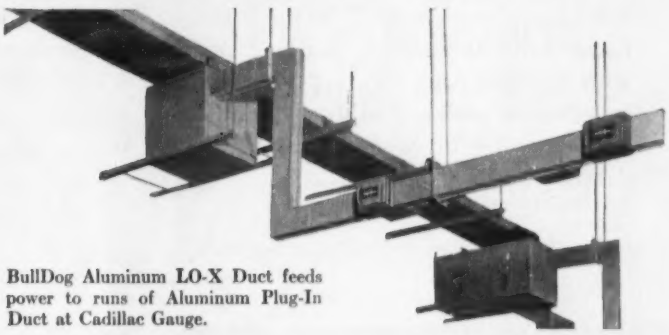
(21) **WIRE MARKERS**—Capable of resisting heat up to 400 F, Hi-Temp markers come in standard codes or can be made to size or specifications, according to the manufacturer, North Shore Nameplate Co., Glenwood Landing, Long Island, N. Y.



Aluminum Bus Duct installation at the new, completely modern plant of Cadillac Gauge Company, Detroit. This job is typical of hundreds across the nation where plants are saving money by specifying BullDog Aluminum BUStribution Duct.



BULLDOG ALUMINUM BUStribution® DUCT



BullDog Aluminum LO-X Duct feeds power to runs of Aluminum Plug-In Duct at Cadillac Gauge.

Everything* you expect in bus duct!

***PERFORMANCE:** If you're looking for safe, efficient, low cost electrical distribution, check into BullDog BUStribution Duct with aluminum bus bars. Seven years of exhaustive research and hundreds of actual installations prove that aluminum bus duct will provide trouble-free, economical, and efficient performance. Aluminum is no experiment or substitute — it is here to stay. Aluminum bus duct is listed by Underwriters' Laboratories, Inc., and carries the same guarantee as BullDog's other systems.

***INSTALLATION:** Runs of aluminum bus duct can result in a considerable weight savings. This light weight, plus BullDog's patented scarf-lap joint, makes installation simpler, faster, more economical. Like all BullDog BUStribution Duct Systems, aluminum bus duct is completely reusable. It is completely interchangeable with other BullDog Duct Systems, plugs and accessories.

***ECONOMY:** Because you save in the original purchase price, in installation and operation costs, BullDog aluminum bus duct brings you the lowest possible current-carrying cost per ampere per foot.

Get complete information on Aluminum LO-X Duct (for feeder and welder circuits) and Aluminum Plug-In Duct (for branch circuits). Consult your local BullDog Field Engineer, or write BullDog Electric Products Company, Dept. EW-44, Detroit 32, Michigan. ©BEPCO

BULLDOG
ELECTRIC PRODUCTS COMPANY

CONSULT THE FOLLOWING PACIFIC COAST REPRESENTATIVES

Coast Electric & Manufacturing Company
1733 N. E. Seventh Ave.—Tel. TUxedo 5191
Portland 12, Oregon

Safety Switchboard Company
910-89th Ave.—Tel. LOckhaven 9-7001
Oakland 21, California

BullDog Electric Products of Los Angeles
2885 E. Washington Blvd.—Tel. ANgelus 9-8101
Los Angeles 23, California

Young Electric & Manufacturing Company
2134 Curtis Street—Tel. AComa 4841
Denver 2, Colorado

the NEW Sangamo Type J2

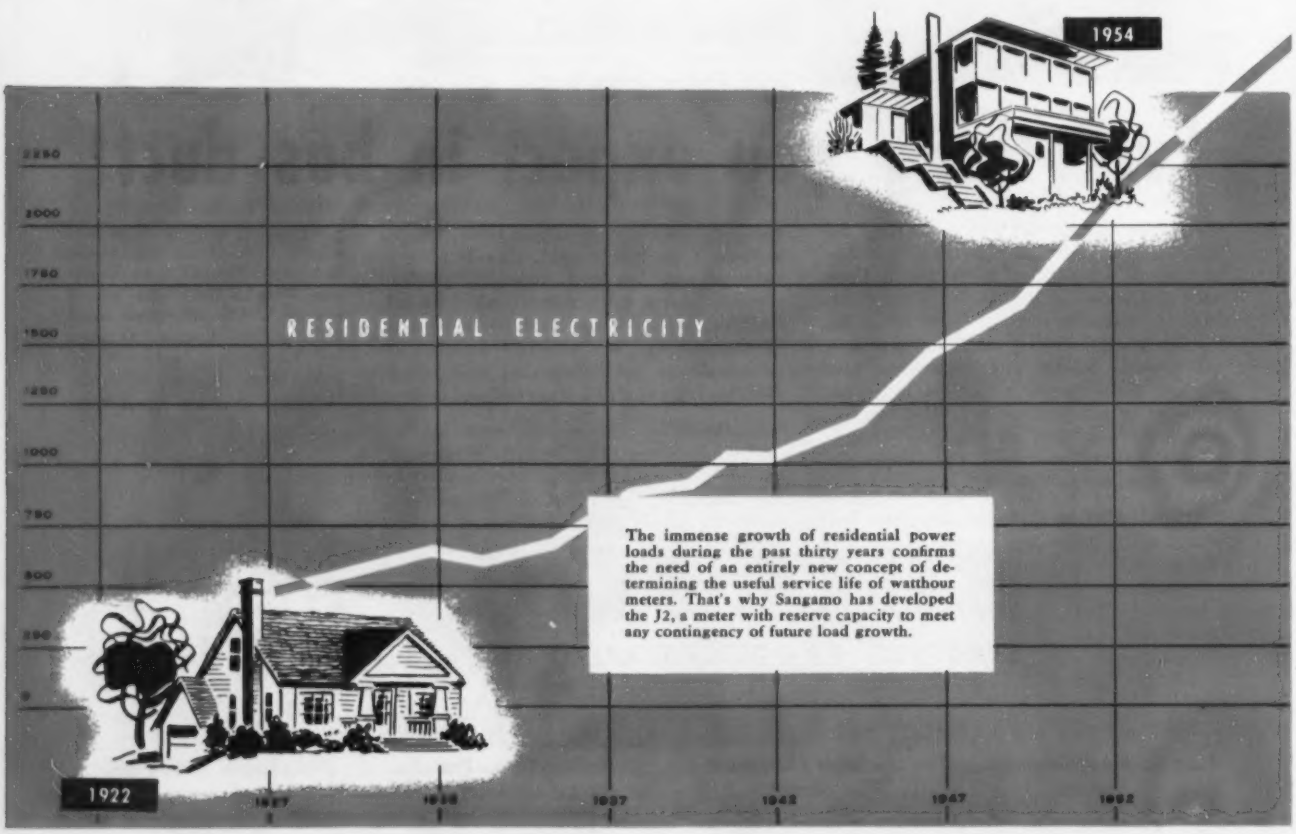
Extended Range Singlephase Watthour Meter

to measure the adequately wired loads of tomorrow

The nation's growing residential power load, built to tremendous proportions by the American consumer's increasing use of household appliances, has led to a crisis that the electrical industry is meeting by an effective adequate wiring program.

Adequate *measurement* of the loads of the future will require a watthour meter with straight line accuracy up to 100 amperes—a meter capable of handling all foreseeable increases in average residential consumption.

The new Sangamo Type J2 *is* such a meter. Its extended range will meet the requirements of accurate measurement for both today and the future. The J2 is not a *revolutionary* new meter, but an *evolutionary* development from the time-proven Sangamo Type J. It retains many features that contributed to the proven electrical and mechanical stability of the Type J. Added improvements all contribute to better and longer performance over an extended operating range.



The immense growth of residential power loads during the past thirty years confirms the need of an entirely new concept of determining the useful service life of watthour meters. That's why Sangamo has developed the J2, a meter with reserve capacity to meet any contingency of future load growth.

The new Sangamo J2 will protect your investment in new meters by providing sufficient reserve capacity to meet any contingency of future load growth—sustained accuracy with minimum maintenance during its entire life—at *no increase in cost or price.*

NOW...

with the Type J2, you get

Accurate measurement to 100 amperes, without sacrifice of performance at light loads.

- Lower disk speed, but with same high torque as the time-proven Type J.
- Increased bearing life with improved bearing performance from a fraction of an ampere to 100 amperes.
- Higher resistance to repeated high voltage surges.
- Improved corrosion-resistant finishes and materials for better and longer performance in humid, salt-laden or corrosive industrial atmospheres.
- Plus all the features that have made Type J the Meterman's meter for fourteen years.

Sangamo presents the new J2 with full confidence that this singlephase watthour meter—the finest in Sangamo history—will prove a much needed advance in meter design.

Get the facts . . . mail the coupon below for your copy of "Protect your Investment in New Meters." It's just off the press, and gives the complete story of the evolution of the Sangamo Type J2 . . . the Meter with reserve capacity for growing loads.

SANGAMO ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS

JM54-1

SANGAMO ELECTRIC COMPANY, SPRINGFIELD, ILLINOIS

Send my copy of "Protect Your Investment in New Meters"

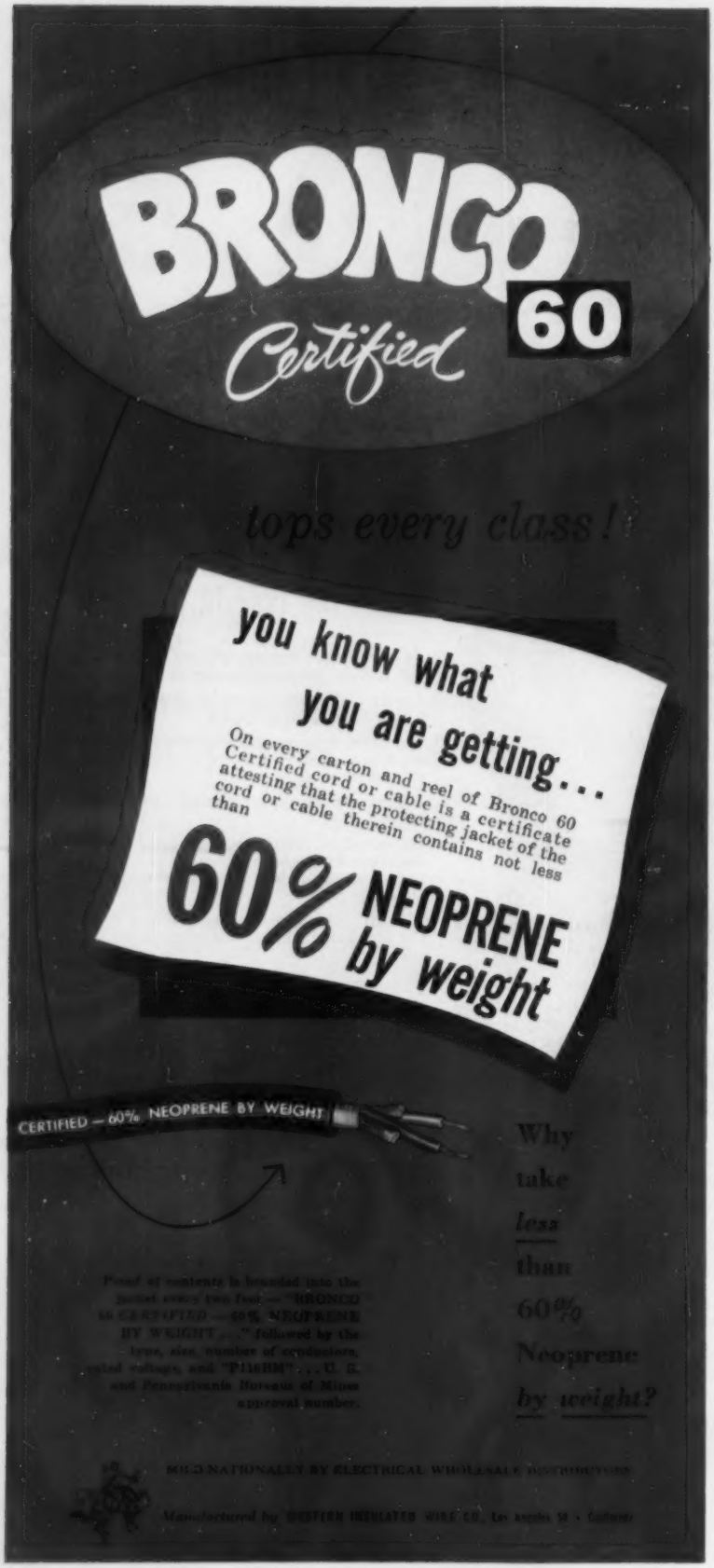
NAME _____

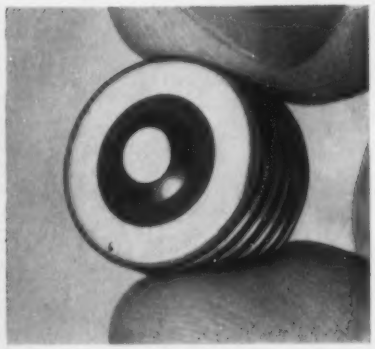
TITLE _____

COMPANY _____

ADDRESS _____

CITY and ZONE _____ STATE _____


BRONCO 60
Certified
tops every class!
you know what you are getting...
On every carton and reel of Bronco 60 Certified cord or cable is a certificate attesting that the protecting jacket of the cord or cable therein contains not less than
60% NEOPRENE by weight
CERTIFIED — 60% NEOPRENE BY WEIGHT
Why take less than 60% Neoprene by weight?



Switch Button

(22) Slater Electric & Mfg. Co. Inc., Woodside, N. Y.

A hermetically sealed switch button consisting of a set of movable contacts in an accordion-like diaphragm enclosure filled with helium gas under pressure is claimed to reduce arcing and pitting and to perform at any altitude, even in a complete vacuum.

It is also recommended by its manufacturer for use where ordinary exposed contacts are likely to be affected by dirt and dust and where combustible materials are present. It may be used also in solenoid actuated contactors replacing the usual silver contacts, it is stated.

Reduction of arcing and pitting is brought about because the high-pressure helium gas cuts down ionization and oxidation, the manufacturer explains.

The switch can be produced in any size.

(23) CORONA DETECTOR — A device for detecting surface corona discharges in high-voltage rotating equipment is offered by General Electric's Special Products Section, Schenectady 5, N. Y. This portable electronic equipment is for manufacturers of large electrical apparatus. It consists of a probe mounted at the end of a 10-ft insulating pole, a control box and necessary cables. Operating power is furnished by a 67½-v dry cell battery and a 1½-v dry cell filament battery. Resonant frequency of the unit is 10 kc.

(24) WIRE STRIPPER — An automatic wire stripper without triggers, cocking or other holding devices is offered by Holub Industries Inc., Sycamore, Ill. It is designed to strip all kinds of building and fixture wire with a single squeeze of the handles. It is made in seven sizes.

(25) FUSE PULLER—An improved test light and fuse puller combination is offered by Holub Industries Inc., Sycamore, Ill. It is made of transparent red Tenite plastic. Jaws are shaped to hold all cartridge fuses up to 100 amp.

For More Data Fill in Coupon, Page 70

YOU EXPECT THE BEST VALUE FROM G-E FLUORESCENT LAMPS

Invisible coating helps new G-E Rapid Start Lamps light faster

THE film of water that condenses on a fluorescent lamp in wet weather is so thin the lamp hardly feels damp. Still, it can connect the ends of the lamp and set up a miniature short circuit. It doesn't injure the lamp. Just steals enough current so the lamp is slow in lighting.

There's one fluorescent lamp, though, that doesn't get sluggish in moist air: the General Electric Rapid Start Lamp.

It has an invisible coating of General Electric silicone, called Dri-Film*. The photo shows what it does to water on the lamp. Makes it stand up in separate drops. In between are dry areas that break the electrical contact. The short circuit doesn't get started. The lamp does.

G-E Dri-Film* doesn't rub off. It's an example of why you expect the best value from G-E fluorescent lamps. For free booklet, "Facts About Rapid Start", write to General Electric, Dept. 166-EW-4, Nela Park, Cleveland 12, Ohio.

*REG. U. S. PAT. OFF.

You can put your confidence in—

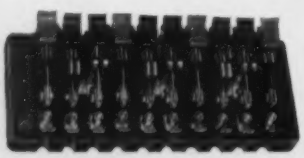
GENERAL ELECTRIC

THE STATES COMPANY

YOU CAN ALWAYS DEPEND ON STATES TEST SWITCHES for performance, safety, value!

Many companies have standardized on States Test Switches because:

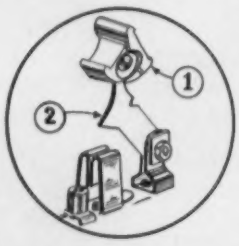
1. No live parts extend beyond base—an important feature.
2. Maximum pressure at jaw contacts.
3. Nickel corrosion resisting finish insures good contact and attractive appearance.



Plus

NEW SAFETY GRIP HANDLE in STATES TYPE "SJK" TEST SWITCHES

Provides easier, safer gripping. New handle mounted on States exclusive angle blade gives sufficient jaw contact.



States testing equipment meets P.U.E.S.R. and National Meter Committee Specifications.

Write direct for full information—or to your nearest representative:

Arthur E. Booth Co. Los Angeles, Calif.
G. L. Hoffman Portland, Oregon
Geo. E. Honn Co. San Francisco, Calif.
J. E. Redmond Co. Phoenix, Arizona
Mt. States Machinery Co. Denver, Colorado
Conley Engineering Co. Salt Lake City, Utah

THE STATES COMPANY

HARTFORD, CONNECTICUT

Explosion-Proof Fixture

(26) Crouse-Hinds Co., 7th North St., Syracuse, N. Y.

Designed by the manufacturer in cooperation with Holophane engineers, the EV series explosion-proof lighting fixtures are claimed to compare favorably in characteristics with nonexplosion-proof units.

The fixture has a prismatic Holophane reflector. When equipped with an inside frosted 5,900-lumen 300-w lamp, it delivers a total light efficiency of 72.3%. Only a small part of the light is transmitted upward through the glass reflector, according to the manufacturer, and most light rays striking the reflector's surface are refracted directly downward to the work area.

Lamp and wiring compartments are individually explosion-proof. An explosion-proof heat- and impact-resisting lamp globe is held in place by a rigid clamp ring.

(27) **COMMERCIAL FIXTURE** — The Star-Liner series announced by Garcy Lighting features side panels of Corning Alba-Lite glass, 30x40° shielding and efficiency of approximately 80%. It comes in two- and four-lamp units in 4-ft length; in 8-ft unit for 96-in. slimlines. Manufacturer's address is 1750 N. Ashland Ave., Chicago 22, Ill.

(28) **F LUMINAIRES** — A new line of Plexiglas fluorescent luminaires in a wide range of sizes and shapes has been announced by Gruber Lighting, 125 S. First St., Brooklyn 11, N. Y. These units have chassis of 18-gage cold-rolled steel, finished in baked white enamel with 89% reflectance. Details in folio P-54.

(29) **F TUBE** — A fluorescent tube designed for soft lighting in hotels, restaurants, etc., is offered by Lustra Corp. It comes in popular wattages, gives a warm, peach-colored light. Details may be secured from the manufacturer, Department GL, 36 Washington St., Brooklyn 1, N. Y.

Industrial Heat Lamp

(30) Sylvania Electric Products Inc., 1740 Broadway, New York 19, N. Y.

A new 1,550-w infrared heat lamp, claimed to deliver three times as much radiation per square inch as conventional 375-w infrared lamps, was designed for diverse applications in commercial drying, baking and heating.

Equipped with two separate filaments, the lamp may be operated at three different wattages, 650, 900 and 1,550, to permit close control of infrared output.

The lamp is made of Vycor glass and is claimed to be highly resistant to thermal shock and to be unaffected by spattering liquids. It is made with a built-in gold reflector designed to project useful heat over an angle of about 120°. The gold reflector maintains a high degree of reflectivity (between 90 and 95%) of its initial value throughout life despite high temperatures, the manufacturer states.

(31) DESIGNED FOR WIDE BOULEVARDS, white-way shopping areas or resort boardwalks, the new Westinghouse OV-60 street light accommodates a 700- or a 1,000-w mercury or fluorescent mercury lamp. Body and reflector are aluminum. Mounted at a tilt of 15°, the light will give uniform distribution of bright light on boulevards up to 125 ft wide, it is stated. It is being made at the manufacturer's Lighting Division, Edgewater Park, Cleveland, Ohio

(32) **LIGHTING FIXTURES**—Two new fixtures, one for ceiling use and the other a wall bracket, have been added to the Sightron line of plastic-enclosed F fixtures offered by Lightolier Inc., 346 Claremont Ave., Jersey City 5, N. J. The ceiling fixture is a four-light 40-w unit for offices, stores, schools and hospitals. The bracket is a 48-in. 40-w unit for use over bathroom mirrors, under kitchen cabinets and in similar installations.

B-M Fittings

THE ORIGINAL INDENTER TYPE E.M.T. COUPLINGS AND CONNECTORS

Briegel, the Original Indenter Fittings are neater in appearance, easier and faster to use. Installation is simple and less expensive. Two quick squeezes sets them forever. Try B-M Indenter Fittings and get more profits from each job.

All B-M Indenter Fittings are U. L. approved as Concrete-tight and for General Use. (File Card E 10863)

BRIEGEL METHOD TOOL CO.
GALVA, • ILLINOIS

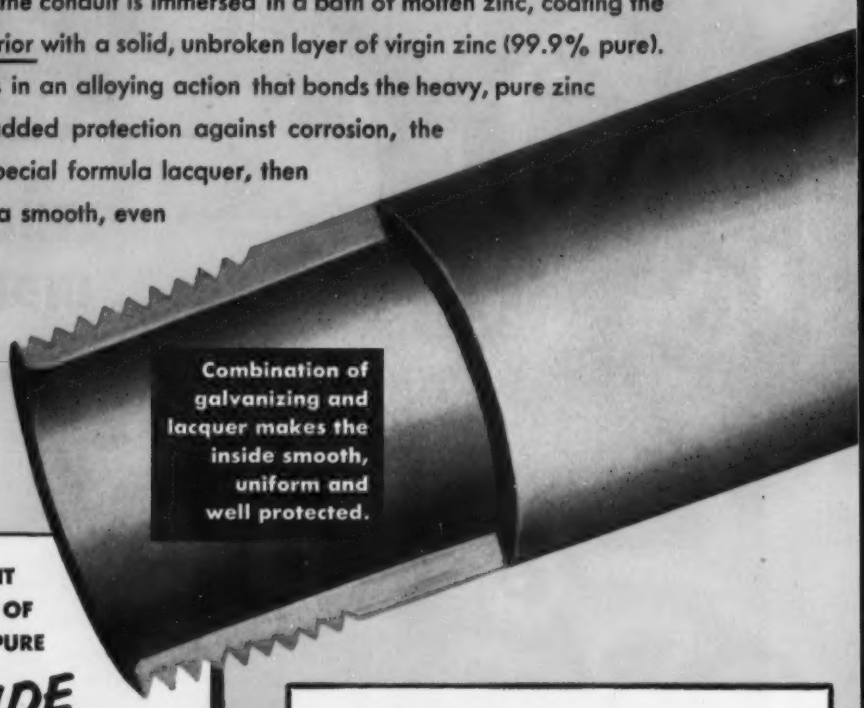
Warehouse Stocks in Principal Cities for Immediate Delivery!

Here are the facts about Triangle's Hot-

Triangle Hot-Dip Galvanized Rigid Steel Conduit is produced from choice sections of the highest grade ingots. This insures a perfect base for proper bonding of the zinc. Every length is thoroughly scoured and pickled in acid, leaving the pipe perfectly clean before the application of the protective zinc coating.

When perfectly clean, the conduit is immersed in a bath of molten zinc, coating the *interior* as well as the exterior with a solid, unbroken layer of virgin zinc (99.9% pure). The hot-dip process results in an alloying action that bonds the heavy, pure zinc coating to the pipe. As added protection against corrosion, the conduit is submerged in special formula lacquer, then baked, giving the conduit a smooth, even finish.

Conforms to Federal Spec. WWC-581b (Galvanized)



Combination of galvanizing and lacquer makes the inside smooth, uniform and well protected.

EVERY LENGTH OF CONDUIT IS IMMERSED IN A BATH OF MOLTEN ZINC — 99.9% PURE

INSIDE AND OUTSIDE

Every square inch of the conduit — inside and outside — is thoroughly and uniformly coated with pure zinc. Remember, because of condensation, the inside of conduit is just as subject to corrosion as the outside. That's why it's important to specify Triangle Conduit — protected inside and outside.

HOT-DIP GALVANIZING IS UNIFORM NOT TOO THIN-

Coatings that are too thin in even one spot, are likely to develop tiny pin-point holes through which corrosion can creep. There is no possibility of thin spots in zinc applied by the Triangle hot-dip galvanizing method. The thickness of the zinc coating is uniform — *exactly* the same from one end to the other. Hot-dip galvanized coating is two or three times as thick as other coatings.

Dip Galvanized Conduit.

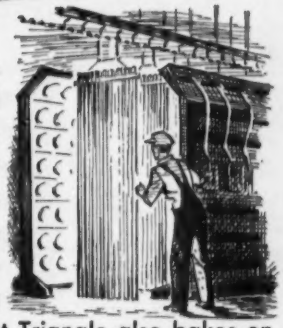
NOT TOO THICK-

If the coating on conduit is too thick, it is subject to cracking and flaking when being bent. Careful controls keep the coating of Triangle Conduit at just the *right* thickness — always.

Never too thick — never too thin.

AND

AN EXTRA BONUS!



A clear lacquer is applied and baked on the conduit. Not only does Triangle apply the best protective coating (molten zinc) but Triangle also bakes on an additional transparent lacquer of special formula. The application of this baked-on coating insures a permanently smooth interior (for easy pulling) and also provides additional protection against rust or corrosion. It also protects the conduit during shipment.

TRIANGLE CONDUIT is Hot-Dip Galvanized—

and Triangle's hot-dip galvanizing has never been surpassed

TRIANGLE CONDUIT & CABLE CO., INC. New Brunswick, N. J.

Manufacturers of Arteries for Electricity, Liquids and Gases

WIRE • CABLE • CONDUIT • PLASTIC PIPE • BRASS AND COPPER TUBE

Plants—New Brunswick, N. J.: Wire and Cable Plant, Rod Mill, Brass and Copper Tube Mill, Plastic Pipe Plant. Moundsville, W. Va.: Conduit Plant.

"It MUST Be Right!"

HERE'S SAFETY—SERVICE

you can always depend on. For Klein tools and equipment are designed better for your jobs—made of the finest materials—individually tested and inspected. Look for the familiar Klein trade-mark—serving the electrical industry "since 1857."

ASK YOUR SUPPLIER

Foreign Distributor:

International Standard Electric Corp., New York

Write for your free copy of the Klein Pocket Tool Guide Today!

Mathias KLEIN & Sons
Established 1857 Chicago, Ill., U.S.A.
3200 BELMONT AVE. CHICAGO 18, ILL.

BULLETINS ETC.

(33) INSULATION—A 32-page catalog giving technical data, descriptions and information on applications, sizes, stocks and use of silicone materials for high-temperature Class H electrical insulation is available from the Publications Department, Insulation Manufacturers Corp., 565 W. Washington Blvd., Chicago 6, Ill. The illustrated catalog covers silicone laminated glass cloth plastics, mica products, rubber and varnish-treated glass tubings and sleevings, rubber- and resin-coated glass cloth and tape; silicone-treated glass cord; Silastic pastes and Silastic R tape and cloth; silicone varnishes, resins, adhesives, compounds and grease.

(34) CLOSING DEVICE—Its portable Pneu-Draulic emergency closing device for use with standard air magnetic circuit breakers in metal-clad switchgear is described by Allis-Chalmers Mfg. Co., 939 S. 70th St., Milwaukee, Wis., in bulletin 71B8105. According to the manufacturer, the device insures adequate closing speed of breakers during loss of control power. It is approximately 8x4x10 in. and weighs about 40 lb; is adapted for use on either 13.8- or 4.6-kv Ruptair circuit breakers.

(35) SWITCH—Literature on its new machine tool limit switch is available from Square D Co., 4335 Valley Blvd., Los Angeles, Calif. Included are a two-color four-page bulletin; a service bulletin; price sheet; application and construction data; dimension sheet for the Class 9007, type T unit.

(36) DATA SHEETS — The large-size Pengo flight auger and the safety pole grip are listed in new catalog sheets from Petersen Engineering Co., Santa Clara, Calif.

(37) BATTERY UNITS — Pacific Electric Mfg. Corp. describes its type BU battery units, 24 or 48 v d-c, in catalog sheet 514. These units give direct current for tripping circuit breakers and in certain cases for their complete d-c operation, including the restoration of closing energy. According to the manufacturer, they are applied when an inexpensive but reliable d-c source is required in cases where there is no station battery or where the circuit breaker is so far away from the station battery that connection to it is inadvisable. The manufacturer's address is 5815 Third St., San Francisco 24, Calif.

(38) FRAMING HARDWARE — A revised brochure on Grid Gains and transmission line framing hardware has been issued by Malleable Iron Fittings Co., Pole Hardware Division, Branford, Conn. Grid Gains are the basic hardware around which M.I.F. framing hardware for round members is designed. They come in sizes for a wide range of pole sizes, various load requirements and through bolt diameters.

(39) SWITCHBOARD INSTRUMENTS — A G-E bulletin on long-scale switchboard instruments is designated GEC-218C; contains a description of the AB-DB-18 and AB-DB-16 instrument lines with principles of operation, characteristics and specifications. Prices and dimensions are given. The bulletin may be secured from General Electric Co., Schenectady 5, N. Y.

(40) SELECTION CHART—A wall chart showing the comparison between old and new NEMA standard dimensions for a-c motors from 1 to 30 hp is available from Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

KILL TWO BIRDS WITH ONE STONE—Fill out this one coupon and get back valuable information from as many sources as you indicate.

ELECTRICAL WEST
68 Post St., San Francisco 4, Calif.

Not good after June 1

Please send me, without obligation, the new product information or catalogs:

If described in Product News, circle item number

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

If described in advertising, fill in page number

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

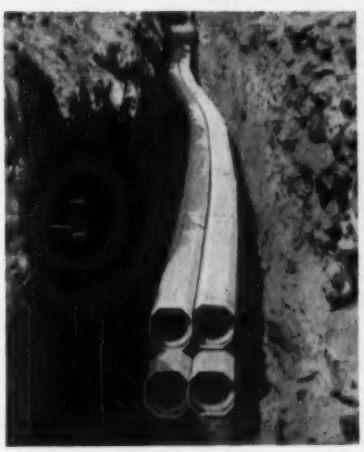
NAME..... TITLE.....

COMPANY.....

ADDRESS.....

CITY..... ZONE..... STATE.....

* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.



Using streamlined construction techniques, OCT-O-DUCT conduit . . .

900 to 1600 Trench-feet a Shift Became Routine on This Job

Thirty miles of 4-way and 6-way underground conduit in a single stretch south of San Jose, Calif., may be a record in itself. But contractors on the job agree that plenty of duct erection records were set. One crew laid 1600 trench-feet of 4-way duct structure in one working day—with only a regular 3-man erection team.

Well conceived specification by the utility, good planning by the contractors involved, and superior features of the new OCT-O-DUCT combined to make this record installation. The field-engineered features of the new flat-sided conduit proved out in this system which involved over 700,000 feet of duct.

Conduit was delivered from factory to trench-side just ahead of trencher. Laying crew followed close behind. One man attached couplings to stacked lengths; another passed pieces to man in trench who easily erected either 4-way or 6-way runs, as specified. 900 to 1600 trench-feet per shift became routine on this job.

What Contractors Liked

These features impressed contractors: Flat sides of OCT-O-DUCT eliminated spacer problems — convenient length permitted easy handling by one-man in deep, narrow trenches—simple, sturdy collar type coupling required no special tools in the field—the impressive strength of new OCT-O-DUCT — trench side delivery.

Man-holes were cast in place around prefabricated portable frames. Earth conditions for the most part were ideal, little or no shoring was required during pouring of concrete encasement. System was ready for cable within two months of starting construction.

Real Circuit Protection

The utility which designed this system knew from experience that smooth Soapstone conduit had unsurpassed electrical and chemical characteristics for permanent circuit protection. It had learned before that Soapstone is the most satisfactory and least expensive duct system. The speed of laying which moved this job ahead of schedule was an additional plus value. So was the lower cost per trench-foot bid by contractors on later sections of the job after they found what they could do with Soapstone OCT-O-DUCT.

If you are not using OCT-O-DUCT on your underground duct jobs you may not be getting the best circuit protection your money can buy.

New Installation Manual

A brand new OCT-O-DUCT Installation Manual is available for the asking. This incorporates much of the experience on the 30-mile system described here, plus the best of the know-how of electric and telephone utilities, municipal and industrial users of Soapstone conduits over the past quarter-century. Send for a copy today. Write:

SOAPSTONE DUCT COMPANY

110 Linfield Drive, Menlo Park, California

Distributed in the West By

MAYDWELL & HARTZELL, INC.

San Francisco · Los Angeles · Phoenix

Portland · Seattle · Spokane

ELECTRA'S HUSBAND

"WILL either or both of you experts tell me whether or not it's possible to talk this country into a depression?" Electra asked one day recently when we were riding up the Sacramento Valley with an Eastern visitor who specializes in economics. "At the rate many businessmen are moaning and wailing about how bad conditions are, they will soon have the public believing it."

"Trouble is that most of the business leaders you've been listening to are talking about somebody else's business," I answered. "If you question them about their own business, they would say it was fine."

"Wait a minute," the economist said. "You did not answer her question. Yes, you can talk the country into a recession. Mass psychology being what it is, the prophets of doom can definitely influence public thinking and public action. Right now a lot of the talk is coming from people who would profit from a sustained business downturn. They are the politicians who are 'out' and the leaders of big labor unions."

"You tend to your driving and let your guest do the talking," Electra warned me. Turning to him, she asked, "How do you size up the business picture?"

"Let me first cite you an instance as to how mass psychology might change the trend of business," our guest said. "Then I'll talk about the outlook. Suppose the Eisenhower Administration felt that it was necessary to take some immediate steps to halt the downward business curve, like cutting taxes to stimulate purchasing and implementing a public works program. It would take a psychologist rather than an economist to tell what might happen. It could be that far from stimulating consumption, a big unbalancing of the federal budget by tax reductions would produce such a vivid and frightening specter of more inflation not far down the road that many people would take to the economic cyclone cellers instead of hurrying out to buy more. The behavior of the consumer is of major importance right now. If he can be induced to maintain his own spending, he can conceivably start the economy moving toward new heights of prosperity."

"You mean that whether or not I buy new furniture for our living room might make a difference between prosperity and recession?" she asked.

"Not literally, but if you multiply that particular purchase by several million discretionary purchases that millions of housewives across this land are thinking about, it surely would," he answered.

"Oh, why not let him talk about business conditions," I jibed. "You're going to redecorate the living room this spring anyway, aren't you?"

Prophets of Doom Can Bring Downturn

"I will now just because I think you don't want me to," she snapped.

"Well if you really want to know how I appraise the business outlook, I can tell you in a few words," the economist said. "In the next few months there will probably be a number of false alarms in the way of upturns—false pregnancies some of my economist friends with an excessive preoccupation with biological symbolism like to call them—but before another winter sets in there is a decided possibility that a sustained upturn will have started. This opinion is based upon a major political development."

"I always thought that politics was influenced by business developments," Electra interrupted casually. "Or is it like the hen and the egg?"

"Political developments have turned businessmen green, blue and black over the last twenty years," he continued. "The thing that heightens the prospect of a relatively prompt upturn is the announced determination by the administration to take decisive steps to check the business decline if the normally recuperative power of spring doesn't do it.

"When it comes to the longer range business outlook, we have found great constructive potentialities for business in the economic philosophy blocked out by President Eisenhower's Economic Report to Congress and related messages. The Economic Report assures business that it can count on vigorous government action to combat any recession, that the government will not hesitate to liberalize credit, to spend more, to cut taxes or to take any other steps that are necessary to prevent a decline from snowballing. That's not a guarantee of 100% prosperity. But it's about as broad a guarantee as you could ask for against widespread and prolonged economic paralysis. And that's enough to firm up a lot of business planning that might not go forward if the government's role were in doubt."

"But isn't it equally true that what the government won't do can be extremely important," I inquired.

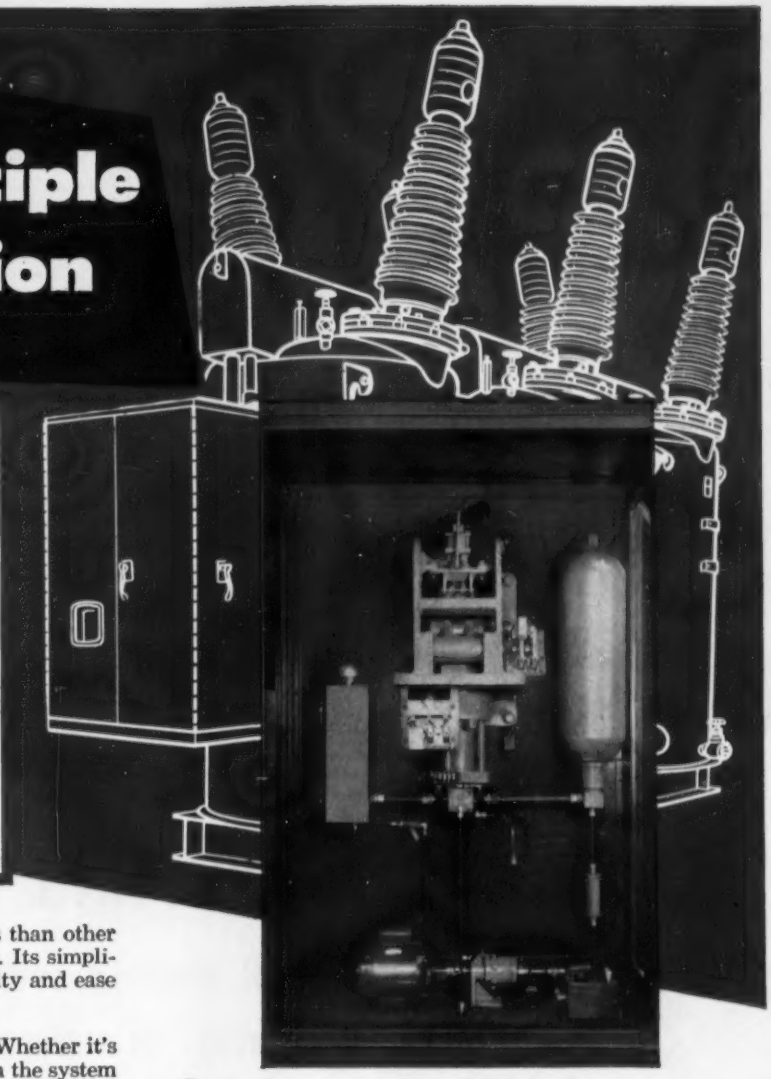
"True, and the Economic Report gives some strong assurance on that subject," he continued. "This is a type of assurance that was notably lacking under the Truman administration. The government will not meddle in business affairs every time some industry or community turns up or down. Action will be taken only to maintain the general level of employment in the face of a general recession. It will not prosecute business firms because they are big—only if they really fail to compete. It will not maintain high taxes, if there is any reasonable way to make economies and bring the taxes down. It will not compete in any field where private business or local government can do the job.

"The report also gives assurances to the individual—that savings will not be allowed to waste away through steady inflation. That minimum security will be provided through old-age, unemployment and other social insurance. That a rising standard of living will be the government's prime concern—a rising standard of living expressed in real terms, not in inflated prices. The emphasis on protection against inflation is something new.

"And most important is the emphasis on incentives—particularly on tax incentives for business growth, ranging from liberalized depreciation writeoffs to deductible research.

"I'd call you cautiously optimistic about business," Electra opined. "I think we'll do the dining room too.

New principle of operation



PNEU-DRAULIC Breaker Operator offers 7 advantages

By using the hydraulic principle of energy transmission — new to the breaker industry — Allis-Chalmers is able to offer an operating mechanism with outstanding advantages.

1 Simple — Has fewer parts than other types of operating mechanisms. Its simplicity is a measure of its reliability and ease of maintenance.

2 Unaffected by Weather — Whether it's hot or cold, the energy stored in the system provides more than the standard number of operations. Use of oil with constant viscosity over wide range of temperatures insures uniform performance.

3 No Moisture Problem — Entire system is filled with oil with inhibitor which eliminates rust and corrosion.

4 No Dirt Problem — In effect, it is a sealed system with efficient filtering to eliminate the hazard of dust and dirt.

5 Fast — In fact, it actually could be set to operate at speeds far faster than present useful speeds.

6 Emergency Closing — It can be closed at full speed onto an energized line even when no control power is available.

7 Mechanically trip-free — The simple mechanically trip-free mechanism, proven on other Allis-Chalmers high speed breakers, has been adapted to the *Pneu-Draulic* operator. A-4285

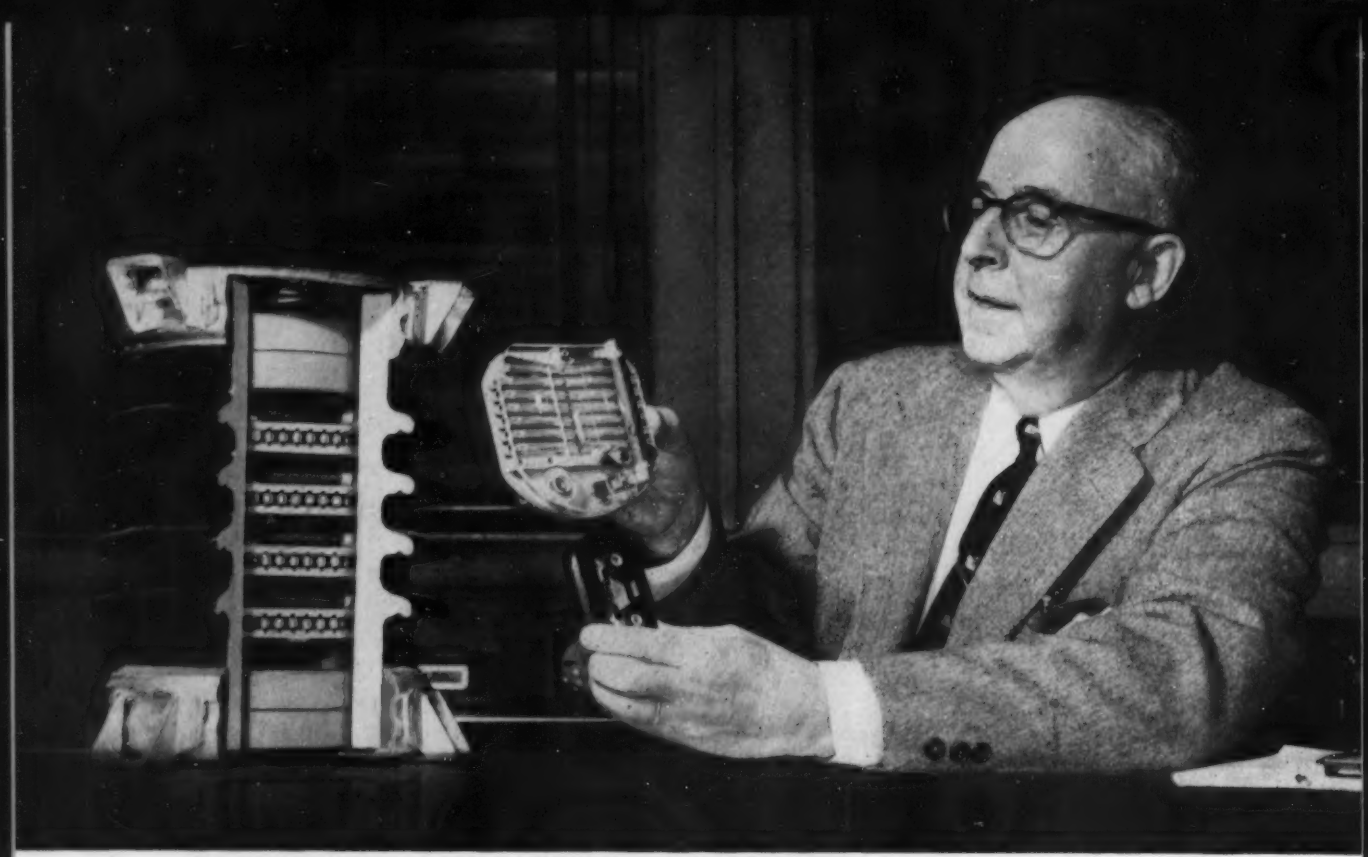
The *Pneu-Draulic* operator is now available on breakers 69 kv and above. Watch for it on other ratings.

It will be to your advantage to investigate further the *Pneu-Draulic* operator and other features of these breakers. Call your nearby A-C district office for additional information, or write Allis-Chalmers, Milwaukee 1, Wisconsin.

Pneu-Draulic is an Allis-Chalmers trademark.

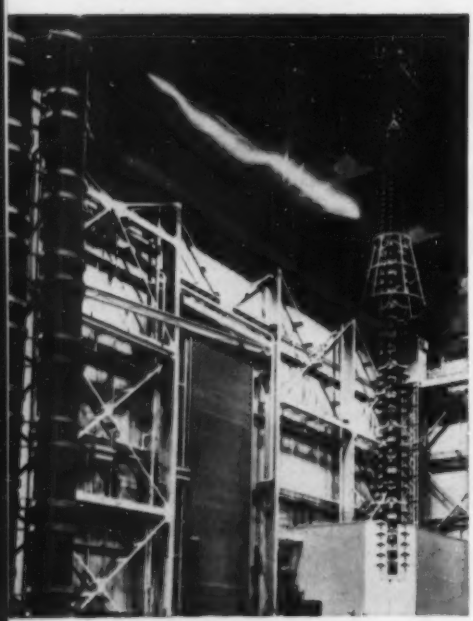
ALLIS-CHALMERS

A-C ALLIS-CHALMERS



KEY ELEMENTS OF THE NEW ARRESTER, gap-unit and magnetic coil, are examined by H. M. Towne, Lightning Arrester Sales Manager at Pittsfield. Location of 4 multi-gap units and valve disks are shown in cutaway of basic 12-kv interchangeable unit (foreground) which has over 3 times discharge capacity and thermal endurance of other arresters. Greater margin of protection is given to system for surges up to 100,000 amperes.

ARE YOU OVER-INVESTING IN INSULATION?



TESTS PROVE PERFORMANCE of new Thyrite Magne-valve station arrester. Here a 330-kv arrester receives 7,500,000-volt lightning discharge during development at General Electric's High-voltage Laboratory in Pittsfield, Mass.

General Electric's new arrester extends scope of application for reduced-insulation in transformers

General Electric's recently announced Thyrite* Magne-Valve station arrester spotlights renewed attention on the potential cost savings inherent in reduced insulation levels on electric utility systems.

Many electric utilities already are taking advantage of the tremendous investment savings possible through reduced insulation levels. According to a recent industry study, all power transformers in the higher voltages of 230-kv and above were manufactured with reduced insulation. However, in the 138 and 161-kv ratings, reduced insulation was specified for only about 50% of the single-phase and 65% of the three-phase units.

General Electric's new arrester—with its outstanding protective efficiency for stroke currents even up to 100,000 amperes—has significantly lower sparkover and IR voltages than previous designs. Thus, this greater margin of protection provides assurance to all system operators, permitting wider usage of reduced insulation even on these 138 and 161-kv systems. Now a more positive approach to reduced insulation is offered to the industry with investment savings as high as 14% on power transformers alone.

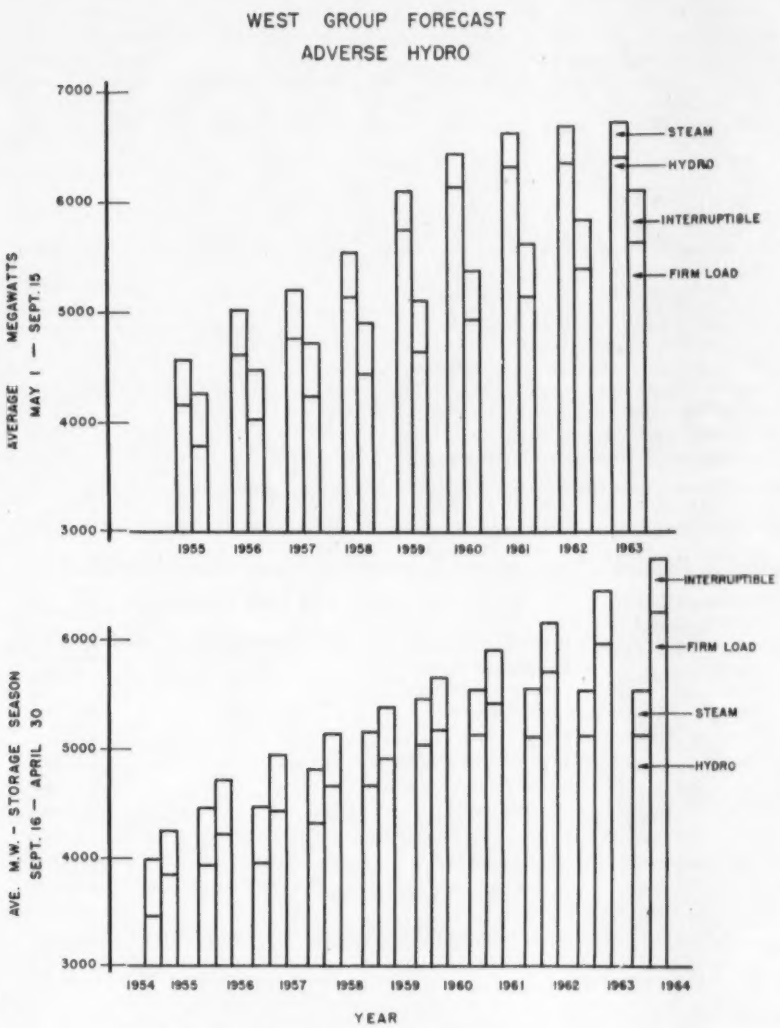
More information about General Electric's revolutionary new station arrester and its application can be found in bulletin GEA-1304L. For your copy, conjact your nearest Apparatus Sales office or write Section 301–257, General Electric Company, Schenectady 5, N. Y.

*Reg. Trade-mark of General Electric Company.

MORE POWER TO AMERICA

GENERAL ELECTRIC

ELECTRICAL WEST
SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED SECTION OF THE U. S.



Northwest Can't Temporize With Its Power Problem

Estimates show that area will be short 155 mw by 1961-62. Report to Erdahl Committee shows six years of grace in which nonfederal agencies must bring large blocks of new power, or else —

• **Power supply** in the area served by the Western Group of the Northwest Power Pool is adequate for the next six years, even under adverse water conditions, but it is imperative that agencies of the region start new developments soon if a serious power shortage is to be averted, beginning in 1961. This became evident from a report submitted by the load and resource subcommittee of the Northwest Power Pool to the Pacific Northwest Conference Committee. The latter committee, under Chairman C. A. Erdahl, met in Tacoma March 26.

Load estimates in the accompanying table are the combined estimates of all the utilities of the area. Estimated resource capabilities are those resources now in operation plus those under construction, or considered to be under construction in the near future. They do not include the many proposed projects of the Army Engineers, the Bureau of Reclamation or of the nonfederal power agencies of the area.

New Generation

New generation included in the resources are McNary, Chief Joseph and The Dalles, all under construction by the Army on the Columbia River, Big Cliff, Lookout Point, Yelm, Dexter and Chandler under construction by the Army on the Willamette River, Box Canyon for Pend Oreille County PUD and Albeni Falls for the Army on the Pend Oreille River. They also included the Ross project for the city of Seattle on the Skagit River and Mayfield and Mossy Rock for Tacoma City Light on the Cowlitz River. The only projects on the list that may be conjectural are the Mayfield and Mossy Rock projects.

Operation and computation of the Pacific Northwest Power Pool is a complicated problem and in order to summarize the results of a 10-year study done month by month of the total load and total resources of the West Group, it requires a boiling down of many premises and assumptions. The figures shown on the tabulation are the loads and capabilities for the period Sept. 16 to April 30 inclusive each year. The West Group resources are approximately 90% hydro and 10% steam. Limitation on the ability of the utilities of the West Group area to carry firm load is the critical period, Sept. 16 to April 30, for the his-

Ten-Year Summary of Estimated Loads and Resources Under Adverse Water Conditions for West Group, Northwest Power Pool

Figures are megawatts for Sept. 16 to April 30 period of each year.

	1954-55	1955-56	1956-57	1957-58	1958-59	1959-60	1960-61	1961-62	1962-63	1963-64
1. Peak firm load	5,596	6,103	6,447	6,782	7,188	7,606	8,031	8,451	8,890	9,358
2. Energy firm load	3,841	4,221	4,449	4,661	4,911	5,174	5,436	5,702	5,975	6,266
3. Per cent firm energy load growth	...	9.7	5.2	4.8	5.4	5.3	5.1	4.9	4.8	4.8
4. Peak firm capability	5,818	6,436	6,486	7,009	7,560	8,042	8,193	8,221	8,254	8,282
5. Energy firm capability	3,993	4,451	4,476	4,817	5,164	5,471	5,547	5,547	5,547	5,547
6. Firm energy surplus	152	230	27	156	253	297	111	—155	—428	—719
7. Added interruptible industrial energy load	400	480	480	480	484	484	484	484	484	484
8. Added energy resources available in median water year	599	714	750	755	832	853	1,017	1,017	1,017	1,017
9. Steam energy included in line 5 capability	517	515	515	499	478	415	415	415	415	415

NOTE: New large block loads included in load estimate are Hanna Nickel, 65 mw, Anaconda Aluminum, 111 mw, in 1954-55 and Harvey Aluminum, 40 mw firm and 80 mw interruptible in 1955-56.

Energy firm capability (line 5) is capability in the critical period, Sept. 16-April 30, of the 1936-37 adverse water year. Capability of West Group is limited by Sept. 16-April 30 energy supply and peak capability (line 4) is in relation to the energy limitation. Machine capacity (not shown) is in excess of firm capability. There is both energy and peak capability either equal to or in excess of load requirements during the balance of the year.

Interruptible industrial load (line 7) is an additional load of the area not included in lines 1 and 2.

Line 8 shows the increased energy resources over line 5 with median water conditions, part of which would be available to carry industrial interruptible loads and to reduce steam-electric generation (balance nonusable in load).

Negative figures, line 6, is a deficiency in firm energy capability.

Line 9 includes steam interchange receipts that decrease in availability in later years.

New Generating Installations Included in Report

Location	Date of Completion	Name-plate Rating
McNary	Dec. 1956	840 mw.
Big Cliff	April 1954	18 mw.
Box Canyon	Nov. 1954	60 mw.
Lookout Point	Feb. 1955	114 mw.
Yelm	Dec. 1954	5 mw.
Albeni	Sept. 1955	48 mw.
Dexter	April 1955	15 mw.
Chief Joseph	Dec. 1959	1,024 mw.
Chandler	Oct. 1955	12 mw.
Ross	July 1957	90 mw.
Mayfield and Mossyrock	Dec. 1958	460 mw.
The Dalles	Nov. 1961	1,092 mw.
	Total increase	3,773 mw.
	Present capacity	4,945 mw.
	Total capacity	8,718 mw.

Source: Load and resource subcommittee of Pacific Northwest Utilities Conference Committee, C. A. Erdahl, chairman.

New Generation Under Consideration

By Private and Public Agencies

Location	Date of Completion	Name-plate Rating
Snake River Plants (Idaho Power Co., including LaGrande tie)	July 1957	200 mw.*
Noxon	Oct. 1958	350 mw.
Swift, Merwin, Muddy and Yale	Jan. 1959	283 mw.
Bruces Eddy and Penny Cliffs	1959	532 mw.
Upper Baker	—	60 mw.
Wells	—	600 mw.
Priest Rapids	—	1,219 mw.
Wenatchee River	—	145 mw.
Boundary	—	570 mw.
Rocky Reach	—	585 mw.
	Total	4,544 mw.

* To West Group.

torical adverse water year. During the remainder of the year there are resources in excess of the load. The firm capability of the area, therefore, is determined by the natural flow of the rivers, which occurred during the period from Sept. 16, 1936, to April 30, 1937.

The peak firm load shown in line 1 of the tabulation is the maximum estimated load that will occur each year in the Sept. 16-April 30 period, and the average firm energy load shown in line 2 is the average load of that period. Since the group capability is limited by energy supply, the firm peak capability shown on line 4 is the maximum demand of the load that could be carried by the firm energy capability. The machine capacity or peak capability of the West Group is greater than that shown on line 4, but cannot be used for firm load since there is no related energy. It is, however, used with better water conditions either to carry the interruptible industrial load or to conserve fuel consumption.

Line 6 shows firm energy surplus or deficiency for the next 10 years. Line 7 shows the estimated interruptible industrial load, which consists principally of primary aluminum reduction and is served by the Bonneville Power Administration. Line 8 shows the increased energy resources available if a median water year should occur.

It should be noted in line 3 that the per cent firm load growth from 1956-57 to 1963-64 is quite moderate. For an area that in the past 10 years has averaged about 15%, this estimated load growth may prove too low. The only new large industrial loads

included in the load estimates are the Hanna-Nickel project in southwestern Oregon, the Anaconda aluminum plant at Kalispell, Mont., and the Harvey aluminum plant to be located at The Dalles, Ore. The Hanna-Nickel and Anaconda plants are under construction and the Bonneville Power Administration says it has a firm contract for Harvey aluminum.

The firm energy surplus (line 6) manages to stay on the plus side through 1960-61 and after that slides rapidly into a large deficiency in 1963-64. The firm energy deficiency shown in 1963-64 of 719,000 kw has a related peak load estimate of 1,100,000 kw. This indicates that some sizable projects must be started by the power agencies of the Northwest in the not too distant future if the load requirements are to be met.

Many Proposals

There has been a flurry of proposals and filings in the Pacific Northwest in the past few months. Hells Canyon awaits a FPC ruling. The Washington Water Power Co. has filed on Noxon Rapids on the Clark Fork River in western Montana and is actively investigating this project. Some economic studies of the project have been made and a considerable amount of diamond drilling has been done. There is additional drilling to be done before a final conclusion is made as to its desirability as a power project. It also has several other difficult problems that must be solved before active construction can be started. It is believed to be the project closest toward possible beginning of construction of all those proposed at present. Pacific Power & Light Co. has the Swift and Muddy project on the Lewis River in southwest Washington under study.

Private Development

Bruces Eddy and Penny Cliffs on the north fork and middle fork of the Clearwater River in north central Idaho are under active preliminary study by the new five-company group composed of the Montana Power Co., Pacific Power & Light Co., Portland General Electric Co., Mountain States Power Co. and the Washington Water Power Co. The Bureau of Reclamation is investigating the Mountain Sheep site on the Snake River and the Army is interested in a number of projects, the principal one for the Army being Libby on the Kootenay River in northern Montana.

Puget Sound Power & Light Co. is talking about the upper Baker project on the Baker River in western Washington and has filed on the Wells project on the Columbia River just below Chief Joseph. The Douglas County PUD has also filed on this project. The Chelan County PUD has filed on a Wenatchee Lake and River project and on Rocky Reach on the Columbia River above Rock Island and below the Wells site. Grant County PUD has its eyes on the Priest Rapids site located below Rock Island on the Columbia River, while the city of Seattle has filed on the Boundary site on the Pend Oreille River in northern Washington.

Many Problems to Solve

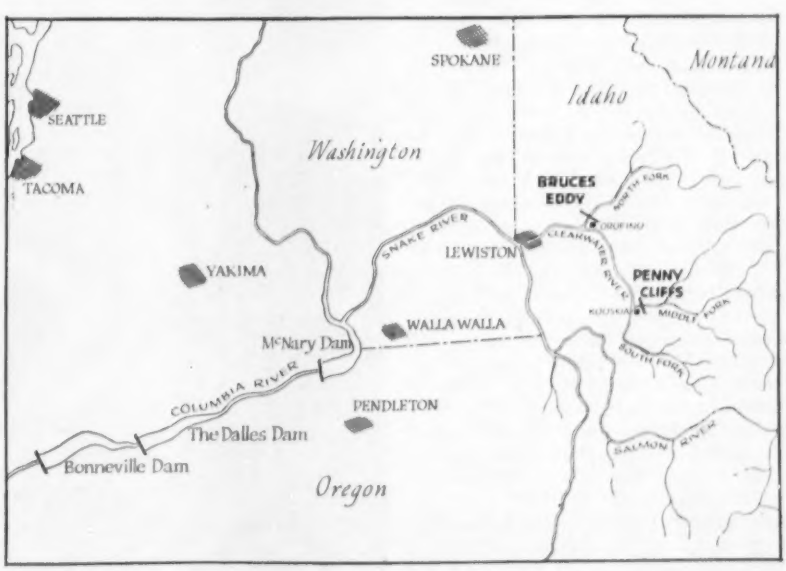
Name-plate rating of all these projects is in excess of 4,500,000 kw with an estimated firm energy capacity of about 2,500,000. This amount of capacity is considerably in excess of area needs in the 10-year period under study but most of the projects have a great many problems other than engineering and will be delayed many years before actual construction starts. They are involved with the federal government, other prior authorizations, flood control problems, fish problems, downstream benefits from upstream storage and other kinds of opposition. The political problems on most projects probably are greater than the financial problem and much greater than the engineering problems. Casualties will be heavy on these proposed projects. While the estimates show that it will be six years before the area again runs out of firm capacity, the time is short for resolving the problems and for the construction of the plants in time to meet the estimated load of the area.

The loads and resources of all the utilities of the West Group of the Northwest Power Pool have been included in these figures. This is in contrast to the operating program of the Northwest Power Pool that includes only the loads and resources of the major utilities who belong to the operating committee. Therefore, figures from the coordinating group in Portland will show less resources and less loads than are shown in the accompanying tables.

The area covered by this report is northern Idaho, the State of Washington, and north and west Oregon down to and including Mountain States Power Co. Included are such utilities as the Mountain States Power Co., Eugene Water & Electric Board, Bonneville Power Administration, Portland General Electric Co., Pacific Power & Light Co., Cowlitz County PUD, Grays Harbor PUD, city of Centralia, city of McMinnville, city of Milton-Freewater, Tacoma City Light, Seattle City Light, Puget Sound Power & Light Co., Chelan County PUD, Okanogan County PUD, Pend Oreille County PUD, village of Bonners Ferry and the Washington Water Power Co. These are the only utilities in the area that have any resources. All other utilities are included in the total load estimates for the area.

B. C. Included

In addition to the resources for the utilities in the group, this report has been coordinated and includes the estimated surplus from the East Group of the Northwest Power Pool and from British Columbia Electric Co., Vancouver, B. C.



Bruces Eddy and Penny Cliffs where five private power companies would develop 532 mw

Smog, that haze that obscures vision and irritates the eyes, a major headache to Los Angeles, is now being brought under control

Needed—A 1¾ Billion-Hp Fan

Much progress has been made in eliminating smog. Electrical industry contributes significantly. More than 700 tons of pollutants being withheld from atmosphere each day by $20,000,000 worth of control devices

Martin A. Brower
Air Pollution Control District
Los Angeles County

If fans were to be used to blow the smog-laden air in the Los Angeles basin over into the desert, it is estimated that 1,750,000,000 hp would be required to drive the fans. Many suggestions have been made for relief from the intense air pollution such as venting the smog out of the basin through tunnels, blowing it away with huge fans or breaking the natural temperature inversion. Engineers decided none of these were possible. The first objection in all cases was the lack of power necessary for moving so vast an amount of air or for cooling the inversion. Calculation showed that it would require all of the power generated by Hoover Dam from 1936 to 1949 to move the air for 1½ days.

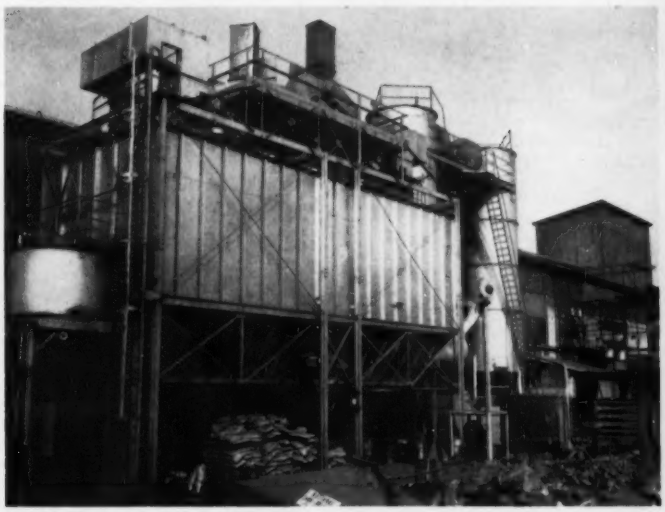
The obvious answer was to control the emission of pollution at the source. With an increase from 2,000 factories in 1940 to 10,000 in 1950, Los Angeles County became one of the world's large areas of population and industrial concentration. In Los Angeles, however, the resulting increase in air pollutants could not rise into the upper air or be dissipated by the winds.

Exhausts are remaining major cause of smog

A high-pressure area over the Pacific Ocean causes air to fall and be heated by compression. This meets the cold ocean air and the result is a layer of warm compressed air over a layer of cold, giving what is known as a temperature inversion. This acts as a ceiling over the entire Pacific Coast, holding down all pollutants. In addition to this, the Los Angeles area is hemmed in by mountains on two sides and has the weakest winds of any industrial area in the world.

The first real progress in doing something about the smog problem came in 1947 when the California Legislature added Chapter 2, Division 20, to the State Health and Safety Code allowing any county or group of counties to establish an Air Pollution Control District. Los Angeles County established such a district during the same year and the Los Angeles County Air Pollution Control District went into operation in 1948. The law made it possible to adopt further regulations, create an appeals board, establish a permit requirement for equipment capable of polluting the atmosphere and gave the district jurisdiction over the entire county regardless of city boundaries.

While inspectors went out into the field to issue notices of violation to visible sources, district researchers began the task of determining more specifically what the pollution was, where it came from and what could



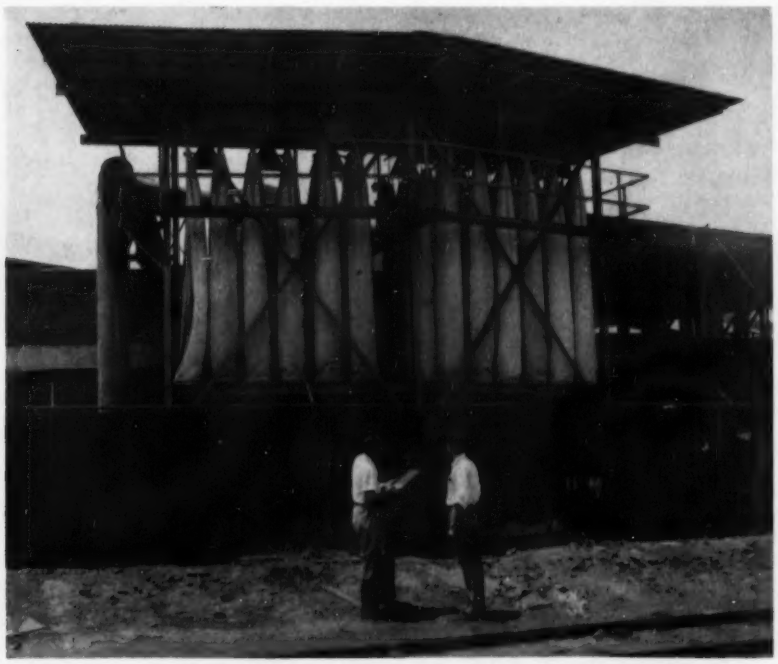
Baghouse at L. A. Steel Casting collects 510 lb of dust a day for steel melt of 83 tons. Right: 1,440 orlon bags collect the dust

To Blow Away Los Angeles Smog

be done to reduce it. Eastern cities had been attempting control of coal smoke for years, but there was no coal burning in Los Angeles County. New methods for identification, testing and control had to be devised.

Obvious pollutants that had to be controlled were smoke, dusts, fumes, vapors and gases. Control equipment had to be designed, built and installed that would reduce these contaminants as much as possible. Here the electrical industry contributed significantly.

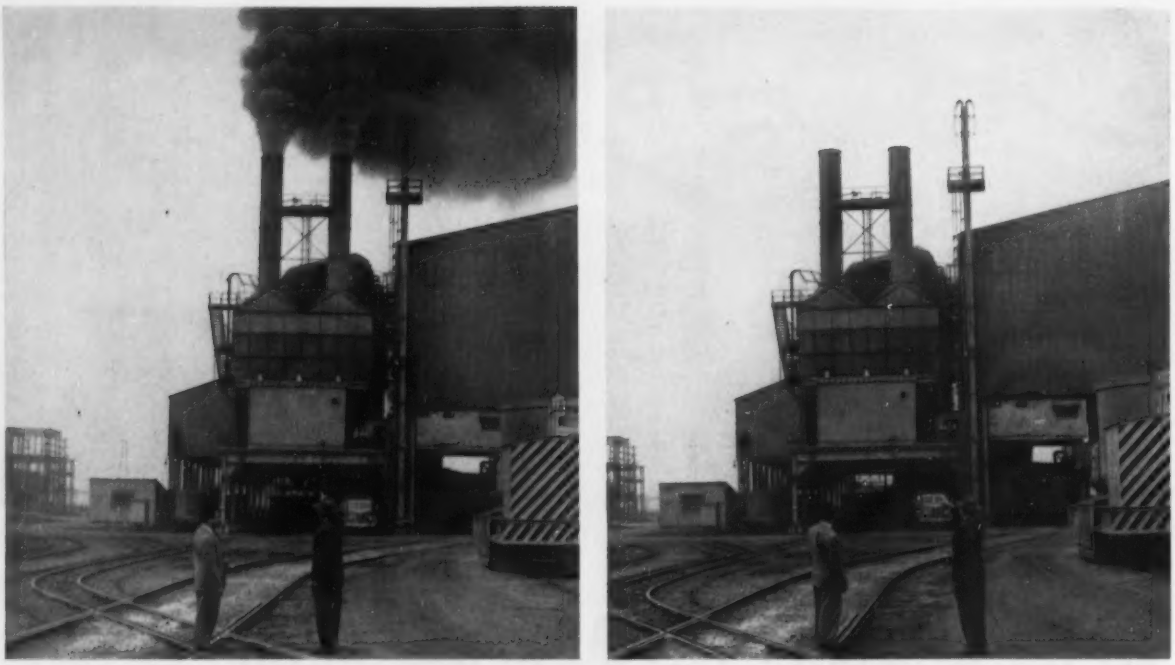
Although certain electrical equipment, such as electric steel furnaces and electric power generation from steam plants, helps contribute to air pollution, without the electrical industry little progress could have been made toward mitigating the smog problem. It took electrical instruments to sample the atmospheric contaminants and it took electrical devices to analyze and identify them.



Most baghouses require a 50-hp motor. There are 460 of them with demand of 13,500 kw

This, of course, was only a small part of the electrical industry's contribution. Almost every control device requires electric power and controls. Installations range from small blowers on cyclonic separators and large blowers and electric shakers on baghouses, through electric smoke indicators on smokestacks and intricate controls on fume furnaces, to the vast electrical requirements of electrical and electrostatic precipitators, which use power not only to move the pollution through the device but also in collection of the contamination itself.

Control equipment now operating under district permit includes 800 cyclonic separators, 460 baghouses, 225 scrubbers and 17 precipitators. Power requirements and control equipment vary for this equipment. The largest of the electrical precipitators requires approximately 40 kw for the precipitator alone. The 17 precipitators have a combined load of 600 kw. Material is blown through the precipitators with blowers requiring up to 60 hp. The larger baghouses have a 50-hp motor, with a few requiring two 50-hp motors. Estimated demand for the baghouses totals 13,500 kw. In a few cases both ferrous and nonferrous electric fur-



Smoke belches from stacks at Bethlehem's steel plant with precipitator turned off. View at right shows effectiveness of equipment

naces have displaced fuel-fired furnaces to reduce fumes.

Much of this equipment was installed in 1953. Over $6,300,000 were spent for control equipment in industry in that year, or more than half as much as was spent in 4¾ previous years combined. Real progress has been made toward the control of smog, with industry having spent more than $20,000,000 to date. Under the opacity regulation adopted in 1947, some progress had been made but it was the dust and fume regulation, put into effect in 1949, that caused industry to take major steps to control emissions.

Sources of Pollution

Following formation of the district in 1947, sources of pollution were classified into incineration and other combustion; ovens and dryers; cookers, kettles and melting tanks; metallurgical furnaces; nonmetallurgical furnaces; spray booth and other surface coating equipments; materials handling; plating, anodizing and surface conditioning; reactors and mass transfer equipment; and petroleum refining. Emissions from most of these sources never before had been controlled.

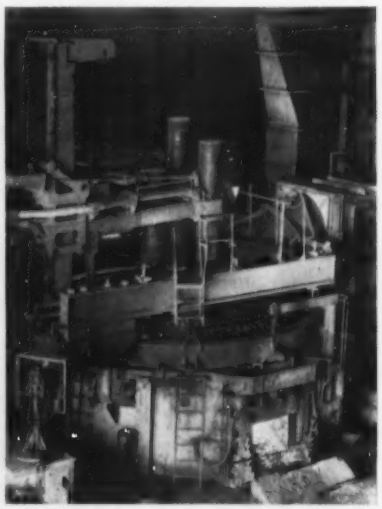
In order to comply with the district's strict emission regulations and to qualify for permits to operate, industry began a program of control construction. The most used control device is the cyclone separator, which operates on the principle of centrifugal separation. It is utilized for large particles and, depending on design and material for which it is used, can reach a high efficiency when collecting large particles. Particle-laden air is blown into the cyclone where the air rises out of the top and the solid material falls out the bottom to a collector. Blower size varies greatly with size of the separator, which might range from one to over 12 ft in diameter.

Cloth filters have found wide use, especially with the addition of rule 54 to the district's Rules and Regulations, which set stringent dust limitations. The baghouse, which uses these filters, is applied widely in the metals industry where its most notable use is on the grey iron cupola furnace. Dust and fumes are blown into the baghouse where cloth or fiber-glass bags collect the aerosols and allow clean air to filter out. A baghouse might cost in the neighborhood of $45,000, although prices vary in either direction. Blowers of approximately 50 hp might be used on a typical installation. The bags are shaken out periodically with electric shaking devices.

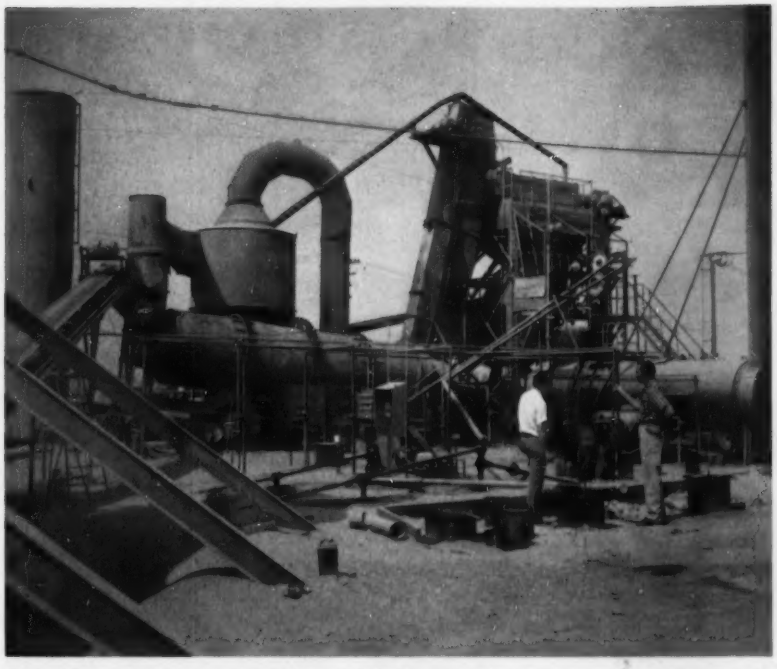
Scrubbers are used to good advantage on certain installations, but have not shown too high an efficiency on others. Although used for some fumes, they do not find as wide a use as do fume burners. These burners have proved very successful in fume and odor control and are usually controlled electronically.

Another very efficient device is the electrical precipitator. Precipitator installations at Columbia Steel Co. and Bethlehem Pacific Steel Co. have run as high as $600,000. The precipitator gives particles a negative charge that causes them to collect on a positively charged plate. Precipitators have potentials of from 15,000 to 100,000 v. Power at one large installation is supplied by motor-driven mechanical rectifiers at 75 kv.

Through the use of such control equipment, plus recovery units, alterations in equipment and changes in operational techniques, more than 700



Air ducts carry furnace fumes to baghouse



Some 800 cyclonic separators such as this help remove 700 tons a day of air pollutants

tons of air pollutants are being kept from going into the atmosphere each day in Los Angeles County.

Automobile Exhausts Are Factor

Still, on a day when the temperature inversion is low, eye-irritating haze continues to invade the Los Angeles basin. It was only three years ago that Dr. A. J. Haagen-Smit, working as a full-time consultant to District Director Gordon P. Larson, reported his findings indicating that gasoline vapors, on entering the atmosphere, oxidize in the presence of sunlight and form an eye-irritating and crop-damaging haze. Further tests substantiated the theory and gasoline vapors, never before considered an air contaminant, became a pollutant that had to be controlled.

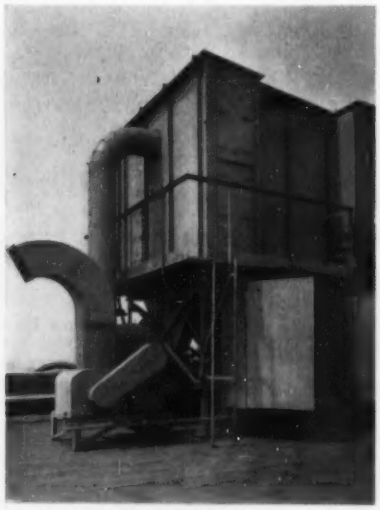
With the identification of the gasoline vapor as a contaminant, Larson outlined a four-point program for the reduction of smog in Los Angeles County.

Investigation into the automobile exhaust as a possible source of gasoline vapors began more than two years ago as the first point in the program. Research was concluded at the first of this year, when it was found that the more than two million automotive exhausts in Los Angeles County pour from 800 to 1,000 tons of gasoline vapors into the atmosphere daily. This material was found to react to form smog in the same way as do gasoline vapors from refineries. Automobile exhausts are now considered one of the major uncontrolled sources of smog in the county today.

Control of the exhaust is therefore needed. The district is currently testing two promising devices and the Automobile Manufacturers Assn. recently sent a technical committee to Los Angeles to study the findings of the district.

The second step in the program is concerned also with gasoline vapors and centers on reduction of the vapors emitted from refining, storage and marketing of gasoline. Reduction of emissions from storage of gasoline was begun in April 1953 when a regulation was passed making it mandatory for all large gasoline storage tanks to be equipped either with a floating roof or a vapor-recovery system. This will keep 120 tons of vapors from the atmosphere daily when the program is completed. The regulation establishes a time schedule for each class of tank. Other sources of gasoline vapors at refineries are also coming under rapid control. Control equipment has been completed on many separators or skimming ponds, vacuum jets, blowdown units, emergency release points, valves and pumps. The control program at refineries is continuing.

Reduction of losses from gasoline marketing, also a part of the second point, is in the research stage. Means for control of vapors displaced from filling of truck, ship and automobile tanks, and control of the small storage tanks at service stations, are not yet developed. These will be forthcoming and a regulation may be needed calling for remedial measures.



Sly dust collector (baghouse) at soap plant

Backyard Incinerators

The one to two million backyard-type incinerators in Los Angeles County are the basis of the district's third point. Approximately 100 tons of smoke go into the already overburdened atmosphere each day from these trash burners. The district believes this is a source that can be controlled and that it is up to each city in the county to begin combustible rubbish collection programs. This rubbish either can be dumped and covered or burned in efficient municipal incinerators.

Point four of the four-pronged program is aimed at possible future zoning of industry, from an air pollution control standpoint, after all possible engineering controls are installed. District meteorologists are making a study of wind speed and direction to determine whether such zoning will ever be feasible. If so, future industry might be located so that it will contribute least to over-all pollution.

As can be seen, the program outlined is one that will take time. Smog can be controlled only by controlling one source after another until pollution is reduced to the point where it is no longer a nuisance. Necessary to the success of the program, however, is public support. When weather conditions bring a bad smog day, public tempers forget reason. With all pollutants identified and all sources known, the job can be done. With the public behind the district's program, Los Angeles County can once more return to the days when it was famous for its pure air.

"Come and get it" does not need to be called out to the 6,000 employees in Douglas Aircraft's new Torrance plant as inviting . . .

Mobile Food Trains

Take the Cafeteria to the Workers

Douglas Aircraft develops in-plant feeding system with central kitchen, 10 dining rooms and battery-operated food trains that make possible feeding 6,000 workers in the same 30-minute lunch period

Ernest G. Alberts

Commercial Cooking and Air Conditioning Engineer
Los Angeles Department of Water & Power

Mobile cafeteria trains, one of the most advanced modern feeding innovations, are now in service at the new Torrance plant of the El Segundo division of the Douglas Aircraft Co. Inc. Said to be the most significant in-plant feeding innovation in a decade, the new service brings the food to the workers in all parts of this 214-acre plant and makes it possible for all employees at work on any shift to eat during the same 30-minute lunch period. With 6,000 employees at present and an ultimate of 15,000, this is a sizable undertaking.

Elimination of staggered lunch periods speeds production as there is no time lost in interdepartmental functions. This is an important factor in assembly line production work where delivery of all parts must be coordinated in order to prevent delays.

Instead of building three or four large stationary cafeterias, as are found in each of the company's other plants, the Torrance plant has a large central kitchen where all food is prepared and then transported to the outlying dining rooms by means of 12 three-car food trains. Each train is loaded with identical menus, complete hot meals, salads, sandwiches and drinks.

Here Is How Plan Saves and Serves

These benefits are listed by Douglas Aircraft as advantages of its new food-train in-plant feeding system:

Staggered lunch periods eliminated
Saving in man-hours lost standing in long cafeteria lines
More time devoted to actual production
Servers reduced from four to one
Dishwashing and china breakage eliminated
One kitchen instead of four
Lunch rooms serve also as conference rooms
Better food and service to workers
Better employee morale

Cheerful combination lunchrooms and conference rooms are taken to the workers, too

Plan Does These Things

- Each train serves from 200 to 400 during meal period.
- Combination plate consisting of entree, vegetable and potato salad is featured at 55c.
- Other hot dishes are available at 25 and 35c per plate.
- Food train system has made possible new low food prices.
- Increased patronage has necessitated adding a second cashier on many food trains to speed service.
- Hot meal can now be served at about price of box lunch.
- Workers are well pleased. Management is well pleased.

Dining rooms, with a seating capacity of 200 to 400 persons each, are conveniently located throughout the plant area. Outside of lunch hours, these serve as conference rooms for use by the various departments or shops. Folding accordion-type walls make it possible to divide the dining rooms into several smaller conference rooms.

How the Feeding Works

Just before the whistle blows, a battery-powered electrically driven train, loaded with freshly prepared hot and cold foods, pulls up in front of each dining room and becomes a miniature two-line cafeteria to serve the hungry workers. A white-clad driver-cashier plugs a single 120/240-v extension cord into a nearby outlet, reverses her driver's seat so that it faces an electric cash register and the two serving lines and she's in business. Employees file down both sides of the stainless steel train and help themselves to tempting dishes of hot and cold food items from electrically refrigerated or heated carts. A second cashier will be added as patronage increases in order to speed service.

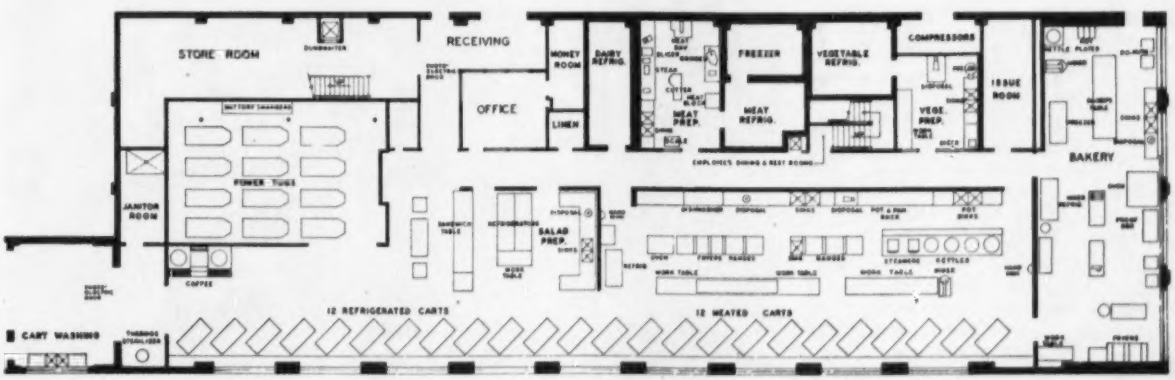
The food is packaged in paper-thin pressed throw-away aluminum containers, each wrapped with airtight cellophane for sanitation and for easy inspection by the customer. Free plastic disposable knives and forks are furnished. Patrons serve themselves at the rate of 10 a minute, as compared with the six-a-minute average experienced by Douglas Aircraft Co. at its conventional-type cafeterias in other plants.

Each silvery train also has a 17-gal coffee urn, equipped with twin faucets and two Wyott cream dispensers. There are two 5-gal cold drink dispensers and shelves for desserts, such as pie and cake. The refrigerated section has containers with salads, milk, juices and ice cream.

Once past the cashier, the worker carries his tray into a brightly lighted dining room with acoustical ceiling and asphalt tile floor, sits down at a Formica-topped table and eats his hot meal.

Advantages Listed

Numerous advantages offered by the mobile lunch counters are listed by John V. Thompson, administrator



Planning for in-plant feeding system required careful thought. Here is the efficient kitchen layout made by Douglas engineers

This all-electric kitchen is an important part of the success story of the new feeding system. Note the disposable aluminum dishes

of the welfare department at El Segundo, under which the company's cafeteria service operates, and S. L. Helm, manager of cafeterias.

Staggered lunch periods are eliminated, which means more time devoted to actual production work, the number of servers is reduced from four for a regular cafeteria line to one driver-cashier, man-hours lost by employees in going to and from cafeterias and standing in long lines are cut immeasurably, equipment and labor ordinarily necessitated for dishwashing are eliminated, and adjustment to handle increased numbers of employees requires only additional carts, not additional cafeteria kitchens.

In addition, it is pointed out that the long, narrow lunch rooms can be divided by accordion-type partitions into four small conference or movie projection rooms, thereby making it possible for every department, shop or administrative unit to have its own private conference room.

Instead of four kitchens as are found in the El Segundo plant, the Torrance plant with its food trains has only one. Here all cooking is done electrically in a combination kitchen-commissary that glitters with tile and stainless steel. It contains several walk-in storage refrigerators and freezers, preparation rooms, offices and a modern bakery that also supplies the division's regular cafeterias.

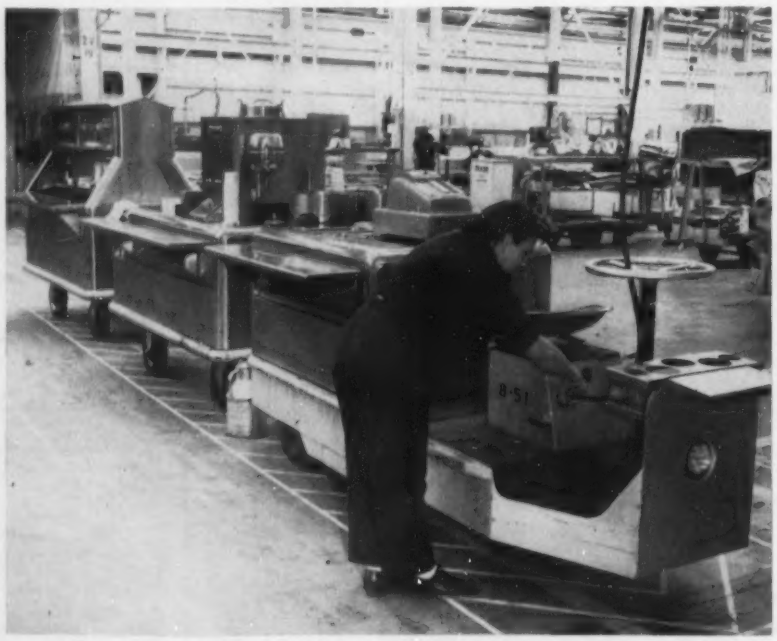
Electrical outlets are provided for warming or cooling of carts before being stocked with food. This kitchen-commissary building is fly-proofed by means of Douglas-designed door fans that send a blast of high-velocity air across the face of doors when opened. Outside doors are opened and closed automatically by photoelectric cell control, which also operates the fly-screen fans.

In the all-electric bake shop, complete with the most modern labor-saving equipment, all pastries and baked goods, except bread, are produced for this cafeteria, as well as for four other Douglas cafeterias.

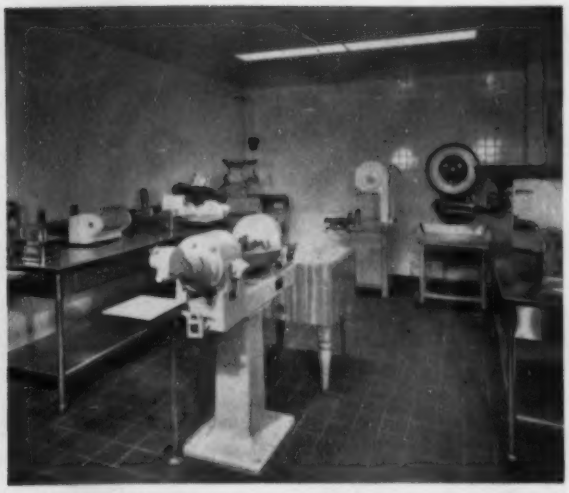
Everything Modern in Electric Kitchen

Robert O. Bielefelt, manager of the Torrance cafeteria, proudly points out many of the innovations, labor-saving machines and the exceptional working conditions for the workers in this ultra-modern central kitchen. Some of the special features that he specifically commented upon were: absence of combustion fumes because of the electric ranges and ovens; ease of cleaning, again because of electric cooking; cleaning possible on *all* sides of equipment because of careful planning and placement of the equipment; all sinks, refrigerators, etc., mounted a distance of 6 in. to 12 in. from walls, again to provide maximum sanitation; the provision of steam outlets every 25 ft throughout the kitchen for cleaning purposes; the tile floor and walls; all equipment mounted on coved bases or high legs; drain valves for all sinks controlled from outside; and the exceptionally fine general illumination.

Foot-candle intensities in kitchen



Cashier-operator sets herself up for business to feed 200-400 workers in a shop area



Coffee is electrically pumped from urns (left) to thermos on food train. Right: Labor-saving machines in meat preparation room

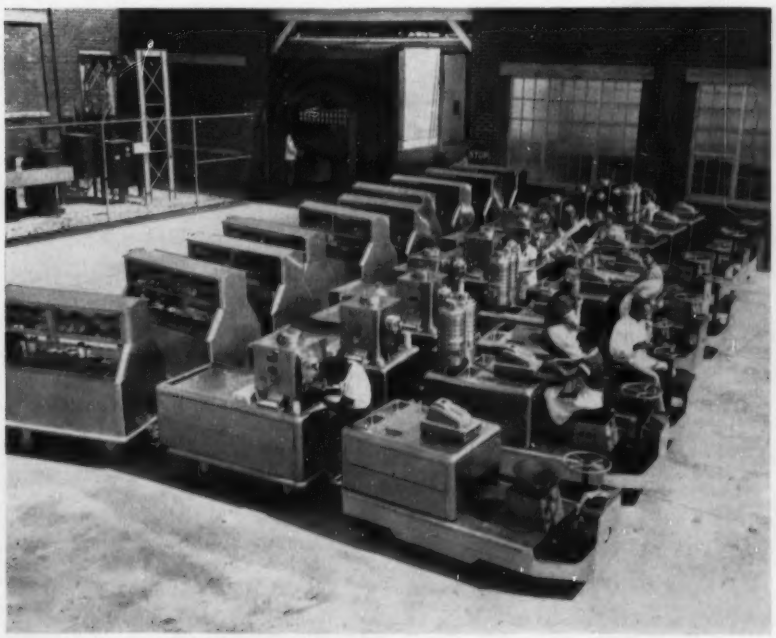
areas are: general kitchen 80; kitchen range section 80; cooks' table 110; clean dish table 90; vegetable preparation 50; meat preparation 50; bakery 85; and storage 40.

Two large Waste-Xit garbage grinders are used in the kitchen, in addition to five smaller Waste King garbage disposal units located at various work areas. A further example of the labor-saving devices can be seen in the meat cutting room, which has the following appliances; Waste King garbage disposal unit, Hollymatic hamburger patty machine, Toledo slicer, electric meat saw, steak cuber and chopper. In addition, there are a number of portion scales, as well as a large platform scale to check incoming supplies and portions. Heavy-duty ranges and bake ovens in the all-electric kitchen were furnished by Hotpoint.

Service Better—Cost Down

In addition to contributing to faster service, prepackaging of foods in the throw-away containers enables close control of portion sizes, which is important for cost purposes and customer satisfaction. Individual portions, readily viewed through the cellophane covers, are more tempting than in the large pans from which service is made usually. Elimination of dishwashing and consequent heavy china replacement costs more than offset the cost of the disposable containers.

In pioneering the new system of in-plant feeding, Douglas not only improved dining facilities but by taking the food to the workers also has saved their time and eliminated the long walks that would be necessary otherwise. All this has been accomplished at lower labor and equipment costs than could be possible for the older style of food service.



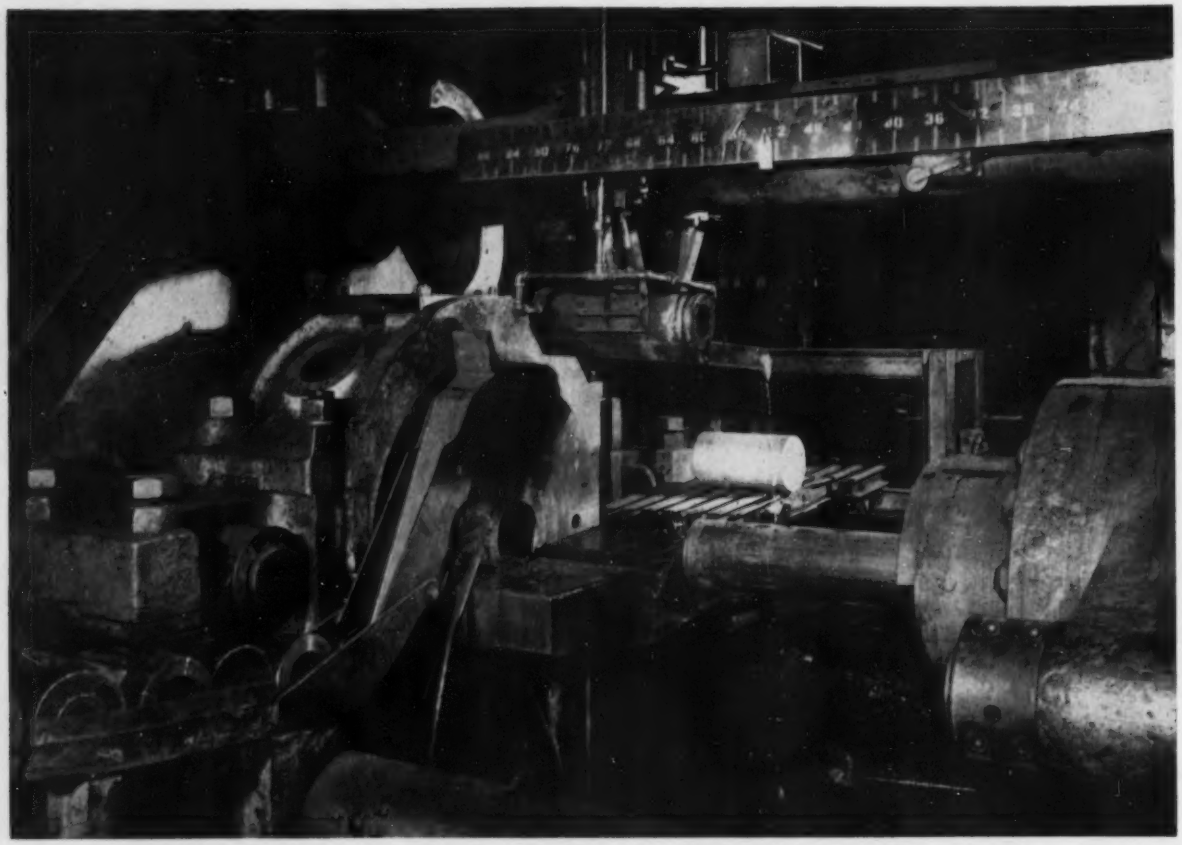
Here food trains are lined up ready to take hot meals to workers out in the shop areas

Electrical Features

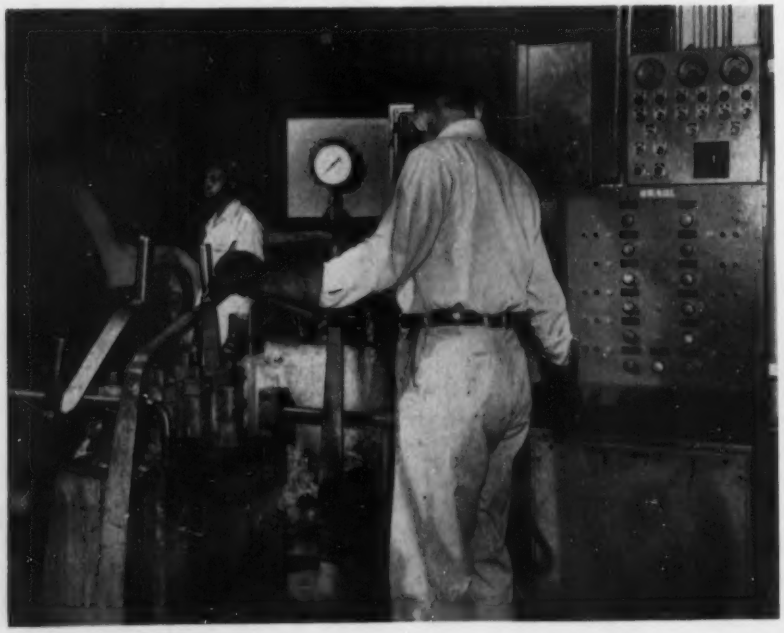
Power and lights for the commissary building are supplied from an industrial outdoor-type substation having three 150-kva transformers for 240-v, three-phase power, and one 150-kva transformer for 120/240-v lighting. Because of the extensive plant area, Douglas uses a high-voltage (13,800 v) distribution network to all parts of the plant.

Total connected electric cooking load is 314 kw and total motor load, comprised of 27 motors, 1/2 to 5 hp (not including miscellaneous small motors 1/6 to 1/3 hp), is 60 hp.

Participating in the design of this new streamlined modern in-plant feeding system were the following: John V. Thompson of the welfare department, administrator of the El Segundo division's cafeteria service; S. L. Helm, in charge of the company's cafeterias; Claude J. Riddle, plant engineer; Van Dyke & Barnes, architects; Stan Abrams, kitchen designer for West Coast Fixture Co., which furnished the kitchen equipment; and K. H. McNeil and E. G. Alberts, commercial cooking and electrical consultants for the Los Angeles Department of Water & Power.



From the induction billet heater shown on the opposite page the metal goes to the extruder here shown. In this machine the hot metal is pressed by a ram under 4,500 psi into desired shapes. From the extruder the semiprocessed rod and tube is moved to pickling tanks where it is cleaned in an acid bath. Acid wastes from these baths are neutralized with soda ash before being dumped into the public sewer. Draw benches from 10 to 25 tons and 60 to 120 ft long finish the products to desired shape prior to final processing



Mechanical controls at left and electrical control board, right, for pumps and extruder

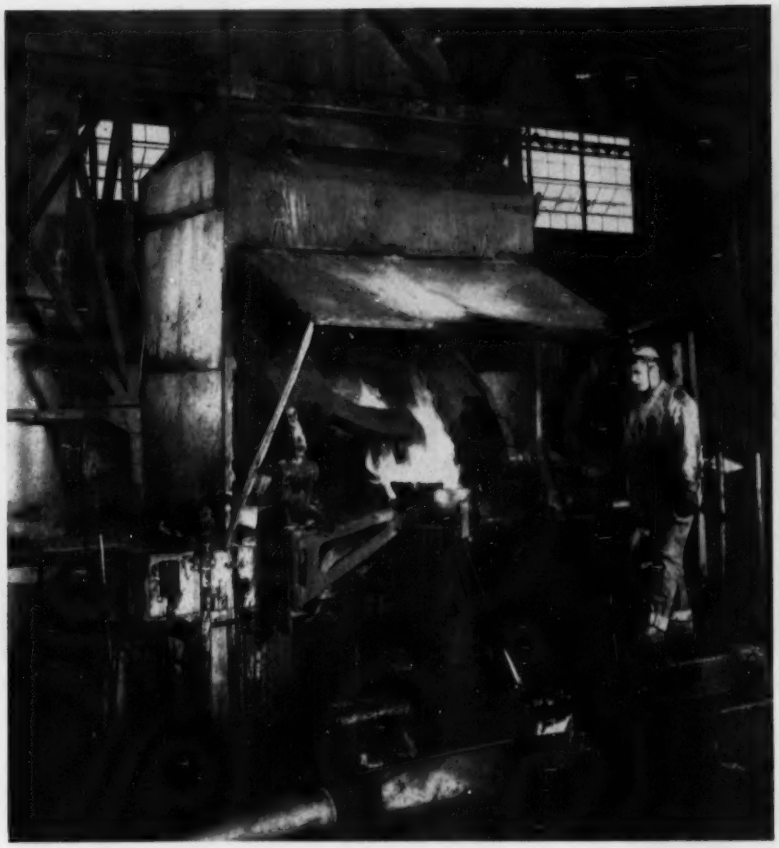
Brass Made

Paul H. Henrichs

Assistant Industrial Power Engineer
Southern California Edison Co.

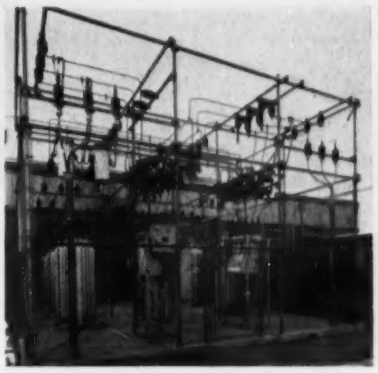
Induction electric heating with its many advantages helps the new Revere Copper & Brass rod and tube mill in Los Angeles produce outstanding metals in the melting stage and again in billet heating prior to extrusion. It is all 60-cycle induction heating that is used so no expensive high-frequency generators are required. The generator is the serving utility.

The plant is designed for efficiency throughout with its numerous electrical applications. The electrical system itself was designed for efficiency, economy, low voltage drop and low losses.



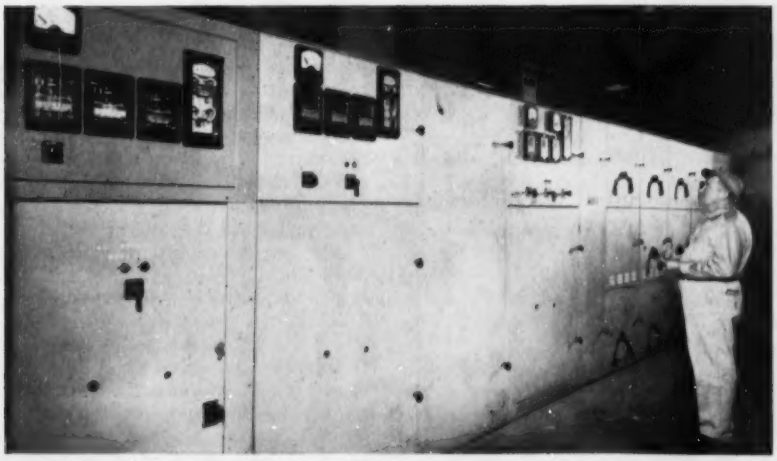
Four induction furnaces do an excellent melting job at Revere. Varying amounts of scrap metal and alloys are combined to produce a high-grade metal. These Ajax induction furnaces afford such outstanding advantages as: good metallurgical control of product; simplicity of operation; improved working conditions; and minimized air pollutant output

Billets are heated to extrusion temperature in just a few minutes in this induction billet heater. Advantages of induction heating are: oxidation minimized by fast heating; reduced losses in event of temporary shutdown; ease and speed of operation; exactly same results every time; improved working conditions; and reduced space requirements

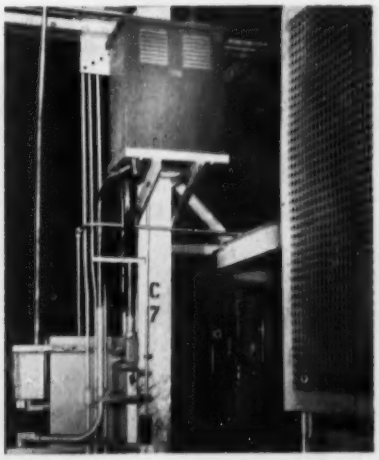


Standardized substation used by Edison company for serving large industrial customers

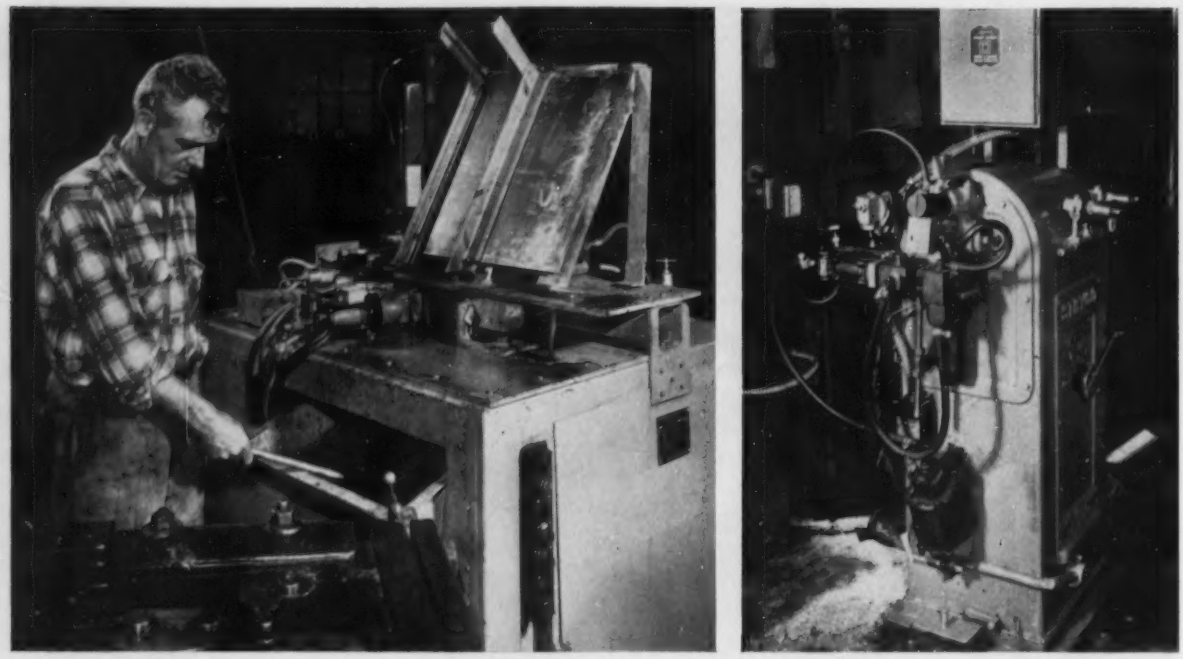
the All-Electric Way



Bus duct is used for feed to main switchboard and for feeders to load centers in plant



Distribution system was engineered for economy and low loss by taking lighting off power mains with dry-type transformers



Blanks for bolts are automatically heated by the resistance heater at left; then fed to resistance bolt header shown at the right

Resistance Heating Cut Labor Cost 50%

Paul H. Henrichs

Assistant Industrial Power Engineer
Southern California Edison Co.
Los Angeles

Resistance electric heating did these things for the Southern Bolt & Screw Co. of Vernon, Calif.:

1. Cut labor cost 50%
2. Produced less scale
3. Made dies last longer
4. Improved working conditions
5. Added flexibility
6. Made it possible to produce a product that formerly was made only in the East.

Early in 1953 the company set out to apply resistance electric heating to metal in the forming of bolt heads. For many years gas-fired furnaces were used for heating blanks. These furnaces have forced draft, which results in much noise, and during hot weather the excess heat contributed nothing to ideal working conditions.

The accompanying photographs show the machine that was developed by engineers at Southern Bolt for experimenting with resistance heating. A used spot welder was purchased. With a few modifications such as air-pressure-operated chucks and a special electrode contact surface, a very effective bolt stock heater was developed. It was so effective that about 100,000 pieces were heated with it. Chucks were designed to handle pieces from ¼ in. to ½ in. in diameter.

The manually operated machine, while too slow for the required plant output, did a good job. It proved that the heating principle was sound, so plans were made for an automatic machine. One was developed and constructed by Specialty Mfg. Co., Escondido, Calif., and delivered in August 1953. One of the pictures shows the automatic blank heater adjacent to the header. One operator can do the complete job here that formerly required two men.

Rod stock of suitable diameter, cut into proper lengths and loaded in the magazine, is fed automatically into the electrodes. When proper temperature is reached, a photoelectric cell opens the circuit and the heated blank is lowered into the receiver ready to be transferred to the header. The heating is so rapid that there is not sufficient time for the opposite end to become hot and the operator can safely pick it up with bare hands if he so desires. By proper selection of heat setting, blanks from ⅜ in. to 1 in. diameter can be heated automatically. Some typical capabilities of this machine are:

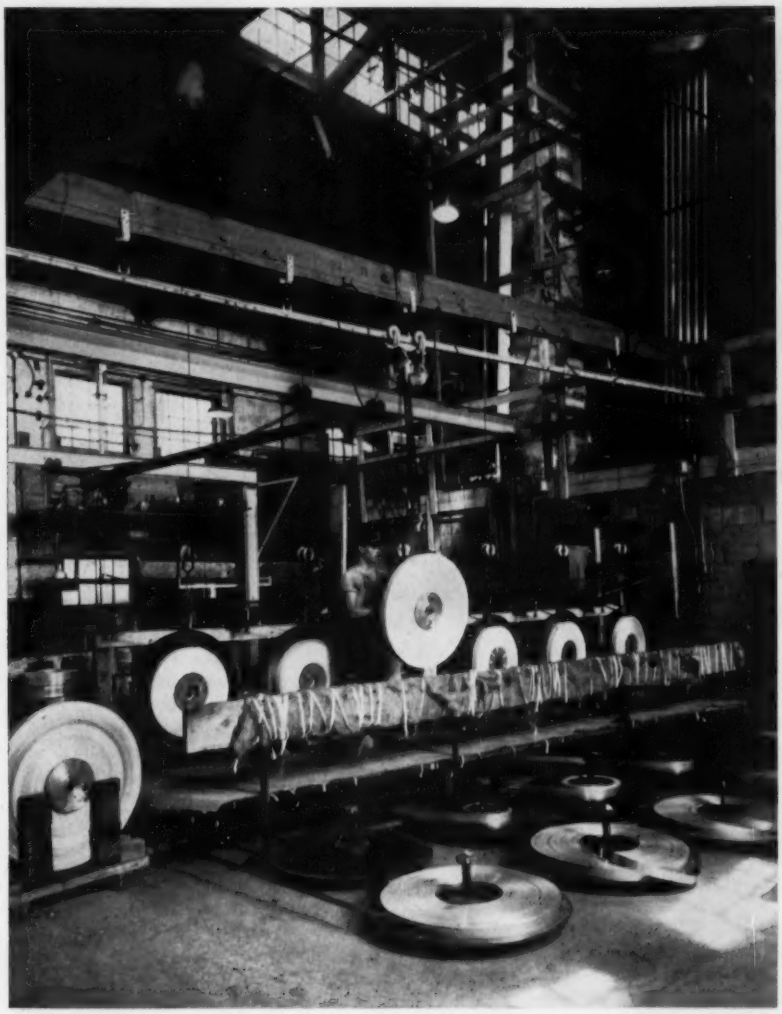
Automatic feed—steel ⅜ in. diameter by 4 in. long, 900 pieces per hour; steel ⅜ in. diameter by 18 in. long, 360 pieces per hour.

Manual feed—steel 1½ in. diameter by no length limit, 10-15 seconds.

The operator reports another big advantage of this method of heating is the reduction of wear on dies. With rapid heating there is a minimum of scale formation. Scale, as any upsetting operator knows, is one of the principal causes of die failure. This rapid heating works exceptionally well for brass, bronze, and stainless and chrome-moly steel. This has enabled the plant to head successfully these metals and produce a product that previously has been made only by the eastern bolt manufacturers.

The heater is portable, too. Much flexibility is realized inasmuch as it can be moved from one header to another as desired. Working conditions are improved, as there is no loud roar from the heater nor is there a tremendous volume of heat dissipated into the surrounding area.

Resistance heating is certainly an effective, efficient method of heating metals for upset operations.



New enamel and continuous strip electric ovens revolutionize metal finishing costs

New Type Enamel Is Electrically Baked

Louis E. Anderson
Industrial Heating Consultant
Los Angeles Department of Water & Power

A new process using a new enamel baked electrically promises to revolutionize finishing costs of many firms using strip steel or strip aluminum. The exact amount of heat required for the process is being supplied by continuous strip electric bake ovens in the plant of the United Steel Products Corp., Los Angeles.

The company originally was a manufacturer of venetian blind slat stock. Several years ago operations were expanded to include the rolling down of wide strip to fine gages, slitting it and, after preparing the strip, coating it with a flexible baked enamel. Since aluminum and steel are left in a state of stress by commercial cold working processes, the company uses a 132-kw Lindberg annealing oven to stress relieve after cold rolling the strip stock.

The recently installed continuous strip enamel baking ovens are capable of finishing aluminum and steel coils up to 14 in. wide and .007 in. to .04 in. thick. After preparing the stock with a chemical coating and a prime coating, the enamel is applied by passing the strip between the rolls immersed in the paint. Then it is passed in a continuous process through the vertical electric baking ovens. These ovens were designed and built by L. J. Pollett, partner, to meet the exacting demands of the product.

Each oven is constructed with 4 in. of fiber glass insulation, is 50 ft. high and contains fourteen 5-kw G-E strip heaters. The heat is produced without combustion and its accompanying products that could cause discoloration of the charge, and is transferred by a combination of radiation and convection. The strip heaters are connected in a number of separate circuits that are controlled by Leeds and Northrup Micromax controllers that automatically maintain temperature zones ranging from 175 F at the bottom to 700 F at the top of the ovens. Minneapolis-Honeywell recording instruments produce continuous ink records. The closer control of temperature and atmosphere obtainable in these electric ovens makes possible lower over-all production costs through the elimination of spoilage. This is an important factor when turning out the 500,000 lineal feet of blind stock and 80,000 lineal feet of awning stock these ovens can handle in 24 hours.

Because of the development of a superior enamel through considerable research in conjunction with local preparation of the strip before enameling, and the scientific and accurate application of heat by the electric baking method, the finish is claimed to be of very superior quality. A 500-hour salt test of the finished product showed no breaking down of the coating. It has such remarkable adhesion to the metal that it can be bent, stamped, roll formed or cut without damage.

• **Success of closed-circuit television** in several of the large utility steam plants built recently in the West, to read gages and observe combustion, indicates that industry may be overlooking the merits of this new electronic tool. It has been suggested that industrial power engineers of the utilities can ingratiate themselves with their industrial customers by pointing out savings that could be made possible with closed-circuit television.

Plastic mounting for the gemlike cuff links you wear may have been cured under these banks of infrared lamps in an Oakland plant

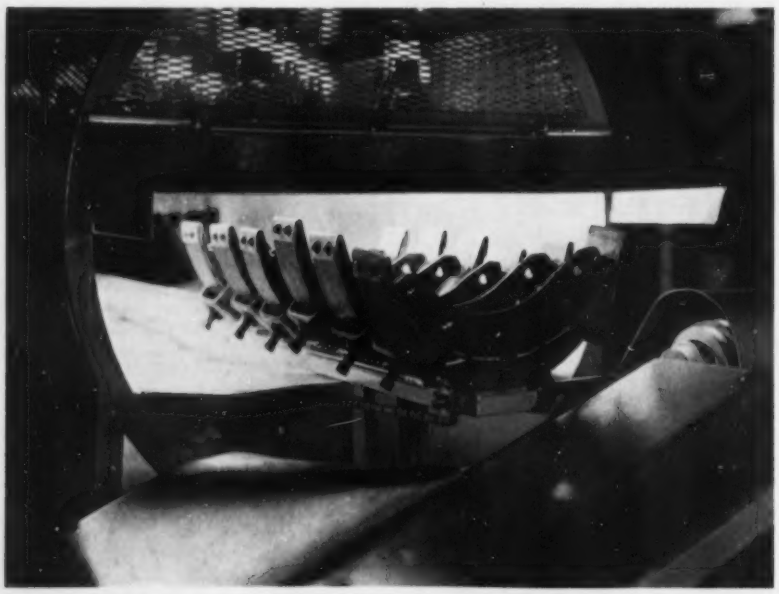
Infrared Cures Plastic Embedments

Banks of infrared lamps for curing plastic enter importantly into the special line of jewelry being made at the plant of Handicrafters Mfg. Co., Oakland. The firm makes the various "stones" used by Hickok in its line of cuff links and other men's accessories. Earrings, pins and brooches also are made for the specialty jewelry trade.

The process is interesting. First, clear liquid plastic is placed in the bottom of small zinc molds of the desired shape. This is set or cured under a bank of infrared lamps, as shown, and forms a transparent top to the stone. About five minutes are required for the curing with fourteen 250-w lamps.

Next, the embedments consisting of shredded gold leaf, pieces of stone, like turquoise, amethyst, etc., are embedded in a clear jellylike plastic on top of the previously cured clear plastic. After this a thin backing of uncured opaque plastic is placed on top of the embedments to form the back of the piece. A piece of clear Pyrex glass is placed on top of each individual mold, the molds packed on small copper-covered boards or pallets, and placed under a second bank of infrared lamps for curing the plastic. This operation also takes about five minutes, using a hooded bank of infrared lamps consisting of four rows of 12 each, 250-w reflector-type lamps. With a mounting height of 4 ft, temperature on the curing table is about 325°. After buffing, the stones are ready for mounting in the particular piece of jewelry.

In seven years Handicrafters has used no other method of curing the plastic. The infrared lamps do such a perfect job that no other method was ever considered. Pacific Gas and Electric Co. is the serving utility.



Infrared lamps replace electric oven for bonding lining in production of brake shoes

Four Times Faster

A new 11-kw infrared oven has increased production of relined automobile brake shoes by four times and cut costs in half over a former method at the plant of Mendenhall Auto Parts Co., Salt Lake City, reports Wayne F. Mulcock, industrial consultant, Utah Power & Light Co. Baking time was 45 to 60 minutes and results were not entirely satisfactory with a 3-kw electric oven formerly used.

In this type of work the problem is to effect a good bond between lining and shoe. It was not always possible to secure a proper bond with the 3-kw oven because of the difficulty of maintaining a uniform temperature with changes in work load on the oven.

The new oven is cylindrical and contains 22 R-40, 550-w lamps. Shoes and lining pass through the oven on a continuous conveyor in 15 minutes, effecting a perfect bond. At the same time energy cost per shoe has been reduced from 0.028 mills to 0.011 mills.

Adjusting electronic speed control for main drive on felt machine

Electronic Speed Control Was the Answer

Frank M. Reis
Industrial Engineer
Pacific Power & Light Co., Portland

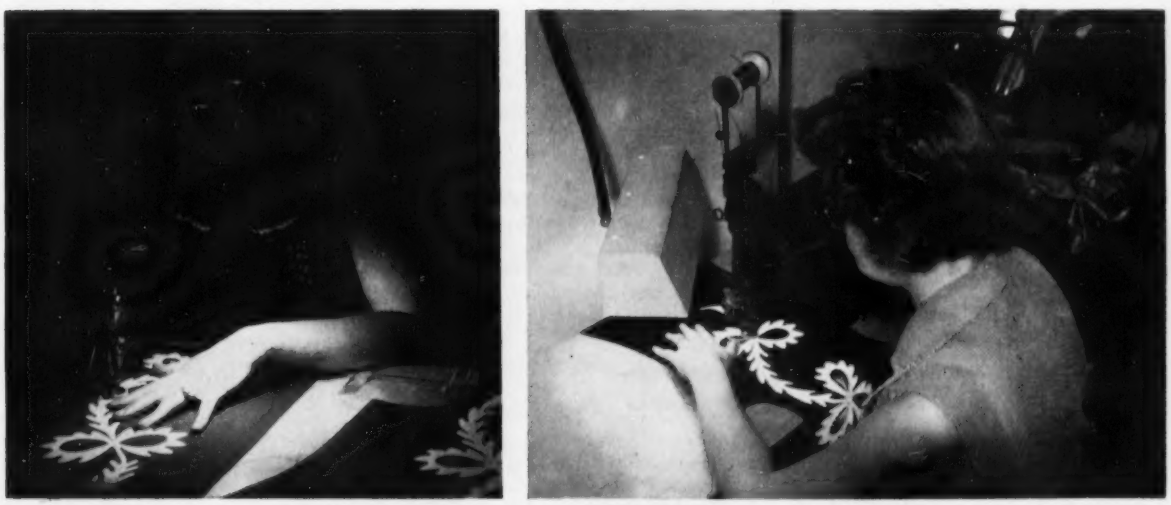
Adjusto Speede drive and electronic control recently installed on the dryer-section motor of the felt machine at the plant of Pabco Products in Portland has increased production as well as turning out a better product. The machine makes roofing felt, the base for Pabco's roofing products. Production is at the rate of 180 ft per minute on light products and 80 to 90 ft per minute on the heavy-weight products.

The new drive has a 40-hp motor with speed range from 170 to 1,700 rpm. Electronic control maintains absolute speed accuracy through a voltage range of 10% (88 v) above and below the 440-v supply.

A 30-hp motor with another type of drive was displaced. This drive had not proved entirely satisfactory because accurate speed control could not be maintained. The result was that uniformity in thickness of the felt was very difficult to maintain. With the new drive, the customer reports an increase in production on the 24-hour operation, less breakage of the felt strip and more accurate weight of the products. Reduced shutdowns from breakage of the felt strip is a major advantage.

Maintenance on the new drive is reduced. Other than lubrication, replacement of tubes on the electronic control is all the maintenance required.

There are many operations of this type where the electrical industry can make an important contribution with electronic speed control.



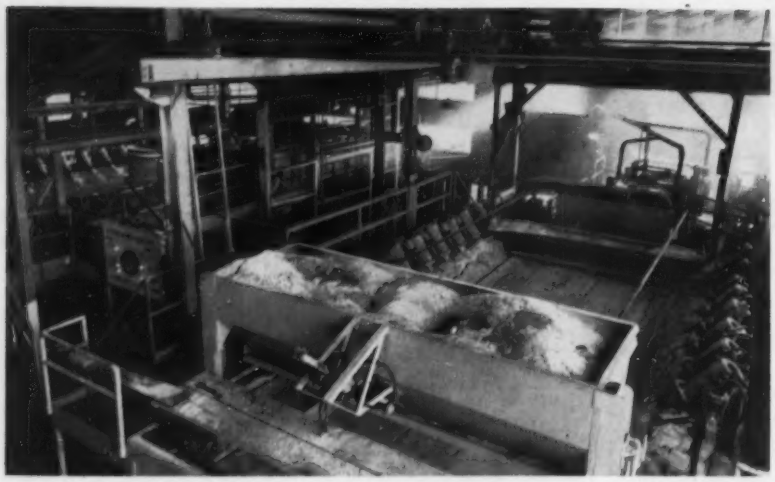
Headaches and eye strain resulted from lighting shown at left. Well diffused plastic shielded unit at right solved the problem

No More Headaches With New Sewing Light

The problem of proper lighting for commercial sewing machines seems never to have been solved until Paul C. Hart, lighting consultant for Southern California Edison, tried a new approach. He had been called into the plant of Miele & Miele at Huntington Park, creators of fine sportswear. Headaches were common and operators all wore glasses with a high degree of correction from using an ordinary gooseneck desk lamp.

Fluorescent light had been tried but made the colors hard to distinguish. General lighting was first brought up to standard. Hart experimented with different combinations of standard elements. Finally he hit on a plan of combining two 50-w and one 40-w bulbs, well shielded and with a plastic diffusion shield, mounted on a long gooseneck.

With the new lighting the operators can sit upright all day, instead of crouching over the machines, with no more aching heads and strained eyes. The accompanying photographs show before and after lighting.



Carbon electrodes shown were replaced with molybdenum electrodes to improve furnace

Glass Quality Up, Costs Down

The Northwestern Glass Co. of Seattle, Wash., in 1945 became the first container plant in the United States to melt glass electrically on a commercial basis and is still alone in this field. It is the only producer of glass containers in the Pacific Northwest, and has now significantly diversified the production of one of its two all-electric furnaces with the initial melting of flint glass.

Previously, the furnaces had produced only amber glass, which accounts for about 40% of the firm's production, while a combination oil-and-electric furnace—also the first of its type in this country—produced all the flint at the rate of 70 tons daily.

In conjunction with the changeover, Northwestern made what Edward S. Campbell, president and general manager, believes to be a major improvement in the furnace. The two rows of large carbon electrodes that formerly protruded diagonally from the top of the furnace on each side were replaced with small-diameter molybdenum electrodes extending into the furnace through the side walls, as in the combination furnace.

The "moly" electrodes, although costing more, are expected to last considerably longer than the carbon electrodes. In the production of amber glass, it is expected that they will operate the entire time between furnace shutdowns for renovation, an estimated three years. This relatively long life of an electric furnace is one of its big advantages. Its repair cost is also relatively low because of the simplicity of its construction. Life of the new electrodes will not be quite as long in the melting of flint glass as in the melting of amber glass but probably still will be longer than that of the carbon electrodes.

The molybdenum makes better contact with the hot glass than the carbon, which tends to repel the glass. Therefore, the moly electrode need not be as large as the carbon. Insertion of the electrodes through the side walls permits utilization of virtually the entire melting surface for heating, something that was impossible when the carbon electrodes passed through the batch blanket.

Advantages of Electric Furnaces

Not only does the revised furnace give promise of exceeding its previous maximum daily output in the production of flint glass but the glass is of unusually high quality. This high quality is evidenced by a high degree of homogeneity and freedom from "seeds" or small glass bubbles. Alternating current, flowing through the molten batch between the banks of electrodes, achieves a more thorough mixing and molecular action that results in this greater homogeneity. Electrically melted amber glass is remarkably free from the "stones" that are caused by bits of refractory material, sand particles or drippings from the top of a conventional furnace.

Northwestern entered the field of electric glass melting in 1945, after having used oil for some 13 years. Natural gas being unavailable in the area, and with increasing oil price, the company determined to utilize the plentiful, low-cost hydroelectric power that is one of the area's assets. Eight years of experience has proved that electricity, although no cheaper than other fuels in the Pacific Northwest, makes possible an increase of at least 5% in production efficiency and, at the same time, produces better glass.

Furnace Construction

The electric furnaces are unique among glass furnaces in that they have open-top melting chambers with no superstructure, no flues or stacks and no checker chambers. The raw materials—sand, limestone and soda ash plus 20% reclaimed glass—are fed in the form of a batch blanket that serves as a well insulated roof for the melting chamber. A mechanical batch spreader is automatically controlled to maintain an accurate glass level. The two electric furnaces are controlled by a single operator from a glassed-in booth located between them.

Initial cost of an electric furnace is much lower than a conventional furnace, while maintenance costs are decreased greatly by simplified design and the necessity for fewer vulnerable parts. Thermal efficiency of the electric heat is virtually 100% in the combination furnace and probably over 60% in the all-electric, as compared to about 15% in the case of oil. Temperatures reach 2,650 F under the batch blanket.

A distinctive difference between electric and other furnaces is the insulation of the electric furnace. This insulation is so effective that a power failure of 30 to 45 minutes causes no concern. Shutdowns as long as eight hours have occurred without solidifying the 90-ton mass of molten glass in each furnace.

In all Northwestern furnaces, the electric heat is developed as a result of the passage of high current ranging up to 10,000 amp at a maximum of 200 v, directly through the molten glass between the banks of electrodes. Power at 13,000 v is supplied by specially designed Westinghouse transformers located near each furnace. Current to the furnaces is controlled by no-load tap changers on the high-voltage side.

Power required for each electric furnace is approximately 1,250 kw. About 1,000 kwh are required to melt a ton of glass.

ELECTRICAL WEST Contractors' News Letter

QUICK NEWS ON TRENDS, LAWS, CODES, MATERIALS, EQUIPMENT, COSTS, WAGES, ETC.

Top of the ladder

J. Scott Milne has been made president of International Brotherhood of Electrical Workers as Dan Tracy had asked to retire. The action was taken at a recent meeting of the executive council of the union. Milne is well known to the West, having begun as a lineman in the Northwest. He rose in union ranks to vice-president for district 8 in 1936, headquartered in San Francisco, and went to Washington as secretary of IBEW in 1947. He did much to organize locals in the utility field in the West.

Historic battle

A union is an involved political machinery which strong leaders run with little opposition from the ranks. The big battle in IBEW occurred in 1946 at the San Francisco convention and Tracy and Milne won out over the then president, Ed J. Brown. Milne went to Washington in 1947 as Tracy's right hand and it has been expected he would succeed Tracy. Joseph Keenan has been named international secretary.

The biggest responsibility

A completely dedicated man is Milne: he has declared so himself. With a keen mind, a gift of eloquence and evangelical zeal for the "cause of labor" he makes an inspired leader. If he can discipline his zeal as he has his life, the tendency of the zealot to make the end justify the means can be checked to the longer-range benefit of his union and its very human members. He has the leadership ability to set such a standard and example in labor statesmanship.

Asking price

Whether it is a maneuver to put employers on the defensive and keep them from asking for reductions in wages or blindness to present realities of employment and the contractor's business potential, demands all the way from 25c an hour increase in San Francisco, 10c in the East Bay, 17c in Ogden and Salt Lake, 50c in Seattle are rumored. Also many fancy travel, insurance, welfare, holiday, and other changes are thrown in for bargaining purposes as negotiations reopen this year.

Disagree

Los Angeles Chapter, NECA, has asked to withdraw from the California Conference of NECA chapters. While no reason was given, it is thought dissatisfaction with the San Francisco Bay Region's acceding to health and welfare is back of it.

Little change

Another NLRB case similar to the previous one has caused changes in the Los Angeles agreement. The closed shop is out and a union shop takes its place under rules very similar to the construction industry contract provisions of the AGC.

Secondary boycott

A cease-and-desist order was obtained by Benjamin Electric Mfg. Co. against local No. 11, IBEW, which had required a union label on fixtures. It had refused to hang fixtures without such label for two contractors in Los Angeles. The fixtures had been made by AF of L union members but did not carry the label. NLRB, in deciding the case, issued a strong order to the union to cease and desist from striking or refusing to handle or install the fixtures.

Open season

Right to represent the maintenance electricians at the American Potash & Chemical Corp. plant at Trona was won, however, by local 11, IBEW, in another NLRB decision. This case, according to Business Week, gives craft unions such as IBEW a "hunting license" to represent electricians and others where industrial unions have held sway.

No drinks in dark

Six foot-candles of illumination may be required as a minimum in cocktail bars in California if the legislature passes a proposal recently made as a result of a reform movement over the liquor legislation of the state. With light meters, the committee at first favored 10 f-c but came down to six. This recalls that city officials in San Diego during the war required 1 f-c in dives catering to sailor and marine trade.

Get in the act

Employers have voted to buy themselves some health and welfare too. Both the San Francisco Electrical Contractors' Assn. and the Alameda County branch of Northern California Chapter in Oakland voted to accept a plan on a voluntary basis with the California Physicians Service and West Coast Life Insurance Co. The plan is also available to the nonunion employees of contractors who sign up for it for themselves and their families. It carries hospital and physicians benefits as well as a life insurance policy.

Expansion

General Electric Supply Co. opened its new office and warehouse building at 450 Second St., San Diego, early in March. Harry Gerster, Western area vice-president, and R. J. West, district manager of Los Angeles, were present for the grand opening. M. A. Hoff, San Diego manager, arranged for the occasion. The new building has 35,000 sq ft of space.

Stiff rules

Inspectors in northern California voted approval of proposed uniform rules for low voltage control systems. These would require 300-v type wire, No. 18 or larger, installed with insulated staples and through bored holes; switchboxes for all switches; 4-in. boxes for the removable relays; access without removing building finish; switches of approved types; relays and transformers or assemblies in attic space near a scuttle hole if 3-ft clearance is not available; transformers at service entrance location; where exposed to mechanical injury wires to be in raceway; connections soldered or approved connectors and taped; no relays in fixtures unless of a type approved for them.

New wire

Okonite has a competing cable to recently approved MI (mineral insulated). It is sheathed in silicone rubber, spun glass and aluminum tubing instead of copper, made to withstand 200° C temperature. It has been submitted to UL for testing and listing.

Conduit

Sealed liquid-tight flexible conduit for connecting motors in wet locations is now being made by several others now, among them California Conduit & Cable Co. of Alhambra; Acme Steel, and others. T&B has developed a new connector with a plastic gripping ring that makes a liquid-tight connection. A tapered tube integral with the connector body grounds the conduit.

Awake with start

Even the homebuilders are awakening to the need for adequate wiring and are acting as if they discovered it. That is what the electrical industry has long hoped for. The National Association of Home Builders, with 30,000 members, finds that 700 of them built 50% of the homes in the U. S. these last few years and only 268 of them built 20%. With a slowdown in home buying they have become aware that electrical features can be sold. The group has set up a technical committee to develop some new wiring standards for tract homes—among them a 100-amp service entrance and stubs to attic or basement for range, dryer or air conditioning circuits. They are also going after the appraisers and FHA to sell them the idea of uprating the value of wiring.

Three benefits

Swimming pools may soon have a utilitarian justification as well as a luxury appeal. In southern California some are being used as a source of heat for heat-pump house heating inside. What if the pool does freeze over, it becomes a skating rink!

Success again

Industrial electric show staged by the Electrical Maintenance Engineers Assn. of Southern California at Shrine Hall, Los Angeles, opened with a big luncheon at the Statler and big crowds the first night. (See pictures and story next issue.) I. W. Borda, Okonite vp, gave the opening address to over 225 industry representatives.

Going strong

EMEA of the Columbia Basin, in Portland, has finished another successful year and election of officers for 1954 was scheduled for its March 25 meeting. Byron Paul, assistant chief engineer of KOIN-TV, was speaker at its previous meeting.

Ground tester

A portable tester by which inspectors can test for grounding on circuits used to feed portable tools has been made up by Tom Hughes, engineer for California Division of Industrial Safety. It has four cords and four plugs commonly used on industrial portable tools so that whatever type is used at the place to be tested one will fit. A switch selects the test circuit and if the ground is adequate a pilot lamp indicates; if polarity is wrong a warning pilot lights.

Going nonunion

Significant figures on wages paid for all electrical construction work in one Western state show that while total wages paid increased by one percent last year the wages paid by contractors, both electrical and general, to union electrical workers decreased by 28%. Yet even in that state demands are being made for higher wages and fringes.

Pioneers pass

Two well known old timers among electrical inspectors in southern California died recently. Jack Crannel, retired former Glendale inspector, died early in March. Harry Ager, Riverside city electrical inspector, died earlier in the year of heart attack. Word that Arthur Kempston, onetime chief inspector in San Francisco, later with PCEA in Los Angeles, who retired several years ago, had died last year was announced.

Anyone you know?

Names in the news lately include these: W. Ron Vernon has been appointed manager of the Edmonton office for Alberta area of Eric Ackland & Associates of Vancouver, B. C. His office is at 9903 145th St. . . . Elmer Favro, lighting specialist for General Electric Supply in Seattle, has been made sales manager of supplies and apparatus. Bert Hubenthal, district manager, also announced that Sidney Van Ness is now the lighting specialist and B. F. James has been made manager of the Spokane branch. He was formerly Seattle supply and apparatus sales manager . . . Lloyd M. Wolfe, Seattle district manager for Anaconda Wire & Cable Co., retired after 32 years. Al H. Leader succeeds him . . . Ray Cook, former Oakland G-E Supply lighting specialist, has joined Reuben E. Lagerstrom, technical marketing service, in San Francisco. The latter has taken on representation of Haluk Lighting Co. in parts of northern California . . . Jim Shirreffs and his son are no longer connected with S&M Lamp Co. but have become manufacturers representatives with their own company, Valley Specialties Co. in Van Nuys . . . Scott Beamer, consulting engineer, is teaching a course on electrical construction practice for the extension division of University of California . . . W. E. Lindley replaced H. J. Chateau in Portland as supervising inspector for Underwriters' Laboratories when Chateau was promoted to head the Los Angeles inspection center and C. T. Brooke of Los Angeles inspection staff was moved to San Francisco as service engineer of the label service department . . . Beth (McCrone) Pack, illuminating engineer with the late Charles Von Bergen, San Francisco, is now associated with Bayha, Weir & Finato, consulting engineers, 1045 Sansome St.

Change address

Moves made recently: P. K. Churchill moved Line Material Co. offices, for which he is division manager, to a new location at 6490 E. Fleet St., Los Angeles . . . Portland offices of G-E Lamp Division have moved from 1238 W. Glisan to 2800 N.W. Nela St., according to C. A. Rost, manager. Must have named the street themselves . . . A. W. Maas, branch manager since the retirement of E. D. Pike, announces that Wagner Electric Corp. offices and warehouse in San Francisco have been moved from 457 9th St. to 219 Shaw Road in South San Francisco, and the Los Angeles office that was at 1240 S. Hope is now at 610 Lairport, in El Segundo. C. E. Widell, formerly in Seattle, is now the Portland branch manager and J. K. Oliver is in charge in Seattle . . . Herman E. Held, district representative for Weston Electrical Instrument Corp., Leach Relay, United Electric Controls, R. W. Cramer and Atkomatic Valve, has moved to larger offices at 147 10th St., San Francisco . . . J. H. McRae Co. Ltd., one of the biggest electrical contracting firms in British Columbia, has moved to new headquarters at 590 W. 8th Ave., Vancouver, marking its 17th anniversary.

New things

Among interesting new products: Ideal Industries has a combination that is appealing—a new crimp connector sleeve, electrician's pliers that include a crimping die and a clever rubber Wrap-Cap insulator to cover and insulate the connection. It is UL listed . . . Westinghouse announces a new line of electric motors, some models doubling the horsepower without increase in size. Called "Life-Line A" the range will start at 1-hp and by fall of 1955 25- and 30-hp sizes will be on the market . . . Porta-Fold is the name given a new aluminum ladder made by Porta-Fold Co. of Los Angeles that can be used as A-frame step ladder, straight or as a scaffold. One lightweight package serves electricians or service men in many ways . . . A hacksaw made round with the teeth circling it is now made for metal. Adapters make it fit any hacksaw frame. Dafile Distributing Co.,

New York, distributes them . . . National Wire & Cable Corp. of 136 San Fernando Rd., Los Angeles, makes up multiple outlet electrical junction boxes for use during construction. Of heavy-duty materials they are available in six types of receptacle combinations and in four lengths of Type S No. 14 cord . . . T&B has a new plastic insulating bushing for conduit that can either be screwed or hammered on. It is to be used with double locknut for bonding.

Policy meeting

Paul Geary, executive vice-president of National Electrical Contractors Assn., planned to come to San Diego April 3 for a meeting of the California Conference of NECA Chapters. Fate of the Western regional office, field service, national dues changes, finances and similar policy matters were contemplated. New chairman, Emil J. Weber of San Francisco, was to preside. Program for the District 6 and 8 joint conference at Reno June 24-26 will also be discussed by Ed Buttner, District 6 vice-president.

Busy slate

Rocky Mountain Chapter in Denver recently held its annual meeting for the electrical inspectors and has on its slate the Wyoming state meeting at Saratoga Inn, Saratoga, May 7-9. Its apprentice graduation ceremony will be on May 4 at Skytrails Inn.

Other NECA news

The Independent Electrical Contractors Assn. of Santa Clara & San Benito Counties has voted to apply for a charter as a NECA chapter. Another chapter may be in formation in the Monterey, Santa Cruz and Salinas area with an office shared by an associated mechanical contractors association . . . New officers of the East Central California Chapter, in Fresno, are Fred Hornig, president; George Appling, vice-president and governor, and Carl Kious, treasurer. Ray Buckley is manager . . . Floyd N. Shipp, new manager of the Utah-Idaho Chapter, with headquarters in Salt Lake City, was formerly a partner in Shipp Electric Co., Midvale, and at one time was district representative of G-E construction materials division in Los Angeles and San Francisco. The chapter has one of the most active business promotion programs, an estimating course going in both Idaho Falls and Salt Lake with V. E. Proctor as instructor, apprenticeship courses and is finally receiving the support of contractors in the Boise area . . . Nevada Chapter has an accounting class going in Las Vegas and has started a plan room where two sets of plans on pending jobs are available to the construction industry.

Screen applicants

Apprenticeship training in Los Angeles area now has a pre-test feature that is worth study. Preparatory meetings are held for those interested in starting apprenticeship. In a four-hour session the whole program, its responsibilities and opportunities, is explained, experience and aptitude tests given. The eligible and willing are thus selected and put on the list for available employment. Don Boyer, apprenticeship coordinator for the NECA chapter, will soon have a story on it for us. Some 550 are under training in Los Angeles county, 150 in Riverside, San Bernardino and Orange counties. About 140 will be graduated this year.

Lots of fun

At least one building on which the electrical contractors will have their name, quipped Bill Varley, manager of San Francisco Electrical Contractors Assn., will be the one his association has bought and is to remodel for its own use—if all the ideas and suggestions of all the members can ever be consolidated or agreed upon. One thing all agree upon, and it is legal, is that this year's annual installation of officers and dinner at Fairmont Hotel, May 8, will be an industry event. This year 50-year oldtimers will be honored. There is only one change in officers. Emil Weber was re-elected president. Earl Peak becomes vice-president as well as governor.

State laws

Idaho's state electrical law awaits an appeal to the supreme court of that state by an electrical contractor to determine whether it is constitutional . . . In Montana the state council of electrical workers will try to get a statewide wiring code enacted to cover rural areas as well as cities, according to a resolution at its annual meeting in Great Falls. NECA chapter there and inspectors chapter are for it . . . Public hearings will soon be held for the proposed revisions to California Electrical Safety Orders, most of which are minor editorial changes and corrections, according to E. E. Carleton, engineer.

ELECTRICAL WEST Sales Guide

News Letter

April 1954

©

FOR THE ELECTRICAL MERCHANT OF THE WEST

The signs for business improving are brightening with spring. Yet like the farmer, the dealer still will need to do some ploughing and seed planting and weeding. But with the excise tax eased a bit there is even some hope that manufacturers may let the relief go into more margin. The employment figures are improving. Inventories are reasonable. And distribution is settling down somewhat. You may finally know who handles what and policies may come back in style. Even a few of the fast-buck operators have gone broke or left TV and freezers for greener fields and customers. The better manufacturers report signs of better orders and sales from better dealers. Take hope!

Signs of spring

Color TV, beautiful to see, may really take some selling after all. RCA-NBC has been broadcasting a couple of color shows a week. RCA has shipped some color sets to the West to sell at about $1,000, with a 12-in. picture on a 15-in. tube; expects to ship some 19-in. sets soon. A series of big color shows will be featured on NBC in the fall to boost sales. . . Emerson will rent, not sell, its first color sets at $75 a month ($200 the first month), including servicing. Los Angeles will be one of the test areas. Emerson will lease the sets to its dealers who will sublease. . . The color situation can be summed up by the experience of one big maker: It costs it $3,000 to make a set. It sells for $1,000 and even at that there are no takers.

Color slows

Westinghouse has declared it will no longer sell to club plans in order to enforce its fair trade prices. Also said it will put electric sheets and blankets under fair trade. They were removed in January. Both Westinghouse and G-E have been getting injunctions, many in the West, against violators of fair trade.

Watch dogs

Quite a stir was caused when an American Home Laundry Mfg. Assn. man made a report saying that ironer sales were so poor four companies would stop making them--Apex, Easy, Bendix and G-E. "'Tisn't so," answered these companies. While not currently in production, they were still in the business, they said. The AHLMA man blushed and apologized. "It was a sad mistake," he said. He also reported decline in dryer totals in 1953 over 1952, as well as in ironers.

Not to give up

More electronics in appliances was predicted by Dr. Goldsmith at the IRE convention. And the AIEE Chicago appliance technical conference May 17-19 will probe into engineering and performance of appliances. Underwriters' Laboratories and laundry appliance manufacturers are working on new test standards because of elaborate controls.

Getting technical

An electronic range, heretofore a theoretical show gadget, will actually be put in production by Tappan Stove with Raytheon's assist. It will be a 220-v unit and first models will sell for about $1,000 but when in production for much less. They are now being tested in several homes. . . Others who have toyed with the idea and may be expected to have one too are Frigidaire, which showed one in its dream "Kitchen of Tomorrow" in the G-M Motorama; Hotpoint, an early experimenter. If it takes, they'll all have one.

Radar cooking

Other manufacturer changes; Sunbeam Corp. will soon be in the arena with a window air conditioner. . ."Wonderair" is the name Servel will use on its entire line of air conditioning. . . American Pfaff Co. is now the U. S. representative for Pfaff sewing machines. . . John Oster Mfg. Co. has bought the Cummins portable power tool division. . . Plant and equipment of former Conlon Bros. Mfg. Co. and trade name "White Way" have been bought by Conlon-Moore Corp., no relation.

Among makers

Frigidaire's "Kitchen of Tomorrow" played its five-minute pitch to over 75,000 people during the General Motors Motorama in Los Angeles and a corresponding number saw it in San Francisco. A preview of it was given the home economists and press in both cities. H. F. Lehman, Frigidaire general sales manager, Verna Miller, home economist director, and Harley Earl, G-M styling section head, accompanied the show. Many of the modular section units displayed may go into production next year.

Dream come true

California Electric Service Stations opened a new branch in Oakland, bringing the number of its specialized authorized service stations for manufacturers of electric housewares and cleaners and blankets to five --Los Angeles, Long Beach, Pasadena, San Francisco, and Oakland at 1246 E. 14th St. They are now authorized General Electric table appliance, clock and blanket stations. Will Aronson, for many years operator of a similar appliance service station, has sold his equipment to the Chamblins and has retired from business in San Francisco. Conrad Gothier, from the Pasadena branch, becomes Oakland manager and Harry Watson manager at Pasadena.

One in one out

An orchid to Howard Emerson, Pacific Coast editor of Electrical Merchandising, for his comprehensive job on what to do about trade-ins in the April issue--a three-month job covering a lot of the West.

Complete treatment

Date changes for the summer markets have been noted. That at Western Merchandise Mart, San Francisco, will be July 19-23. Chicago's home furnishings market will be from June 21 to July 2. . . Making market day for buyers on Monday instead of Friday seemed to start with promise on March 15 in San Francisco. At least it seemed to bring in some new buyers.

Next markets

Two important appliance shows in April and several coming later. The Spring Fair of Appliance Merchandisers Assn. in Phoenix runs April 8 to 11. In San Diego the Bureau of Home Appliances stages its annual Spring Fair of Modern Home Ideas April 23-28 and will use closed-circuit color TV as a major attraction. . . Oroville Appliance Dealers Assn. has set June 2-3 for its big appliance show in the municipal auditorium. . . . Los Angeles Home Show, in which the Los Angeles Electric League is a participant, will have its big affair at Pan-Pacific Auditorium June 10-20. . . The WESCON electronic show in Los Angeles will be from Aug. 25-27.

Show times

National Water Systems Month is May and material to begin promotion in April is offered by the Plumbing & Heating Industries Bureau.

Kit offered

Hawaiian Electric Co. is offering a wiring allowance, through the appliance dealers of Oahu, of $50 for a range, $20 a water heater. . . In Arizona the dealers are joining Arizona Public Service Co. on a dryer campaign that runs to May 15. . . Pacific Gas and Electric Co. has announced its 1954 domestic sales promotion program with a giant brochure, the center spread of which is a calendar of monthly promotions and the media to be used to advertise them. For April it is TV, for May it will be air conditioning. . . In Salt Lake City, Utah Power & Light will tie in with the annual food show of the retail grocers association.

Drives for sales

Two top executives addressed the San Francisco Bay district NARDA group in the last month--Les Hoffman, president of Hoffman Radio Corp., Los Angeles, and H. A. Warren, G-E manager of marketing, from Louisville. After their prepared talks, each did his best to answer the policy questions addressed to them by leading dealers. Both advised concentration on one or few lines. Hoffman debunked the fears prevalent about TV. Warren stressed the mutuality of responsibility in giving value to a franchise. Carl Hagstrom, NARDA regional v-p, arranged for the programs. Clarence Dulfer presided. . . Questionnaires have gone out to dealers for NARDA's 1953 Cost of Doing Business Study, an important guide for the whole appliance business.

Answer the dealers

To attempt to keep you up to date on distributor changes: Electrical Distributors Ltd. of Hawaii signed up to handle International Harvester products. . . Thor Corp., which once had a factory in Los Angeles, once more opened a factory sales division at 1440 W. Olympic amid circus ceremonies that included the Norse god Thor, clowns and cuties, the latter delivering invitations to dealers. Kierulff Co. had been Thor distributor. . . Ironrite has appointed Sues, Young & Brown for nine counties of southern California but Distributors Inc. has San Diego County. In Seattle it is Columbia Distributing Corp. F. B. Connelly Co. formerly had it. . . A new distributorship has been organized in Los Angeles--Goetten and Zastro at 2262 E. 37th St. It will handle the Apex-Rotarex line, also Quicfrez refrigeration products. . . Eureka Williams has signed Salyer Distributing Co. in Albuquerque and Schwabacher Hardware in Seattle. . . The DuMont television distribution in Alaska is handled by Nash-Kelvinator Sales Corp. . . Par Distributing Co. in Billings is Youngstown agent for that area. . . Horne & Cox will handle both the ABC laundry equipment and Raytheon TV lines for San Diego. ABC was formerly handled by R. E. Harris, and Raytheon by Graybar. Horn & Cox has handled Chrysler Airtemp there.

Passes behind the lines

Ben Hur Mfg. Co. named Great Western Fuel Co., CBS-Columbia and Iron Fireman distributor in Spokane, as its agents and in Denver Public Distributing Co., who also has Emerson TV. . . For western Colorado Emerson appointed Biggs Kurtz Co. of Grand Junction. . . The Pacific Mercury distribution has been changed in Fresno and San Francisco. N. C. Teakle Co. becomes a sales agency and factory sales representative in Sacramento, San Francisco and Fresno report to it. . . Six regions have been set up by G-E Air Conditioning Division. That for the Western states is No. 6 and W. D. Paulson, San Francisco, heads it. There were formerly only four regions. . . Muntz TV, which tried direct factory selling, thought it might try distributors, then changed again to direct-to-dealer. It has tax trouble too. . . New quarters were moved into by General Electric Supply Co. at 450 Second St., San Diego, and by Admiral Distributors Inc. in Los Angeles at 6565 E. Washington.

Here too

Schick Inc. now has what it claims is the thinnest and lightest electric shaver, which it calls a "Custom" Schick to retail at $28.75.

Thin shaver

Two old-timers well known to the appliance industry passed away in March. In Los Angeles it was Harry L. Harper, 67, retired former Pacific Coast manager of Graybar. The other was Fred W. Porter who, since 1926, when he started as salesman in Seattle, was with Landers, Frary & Clark and was manager in San Francisco for years.

Pioneers gone

Westinghouse, in a move to intensify its drive to sell more appliances this year, has reorganized its appliance division in three columns. Walter Baker, who was Pacific Coast district appliance manager, will head the major appliance drive; Paul Bradner the portable appliance drive; and Charles Winston that of refrigeration specialties. Baker has under him Eugene J. Riley as new Pacific Northwest district manager; Harry B. Fay, Rocky Mountain district; R. F. MacGillivray, northern California; and Robert J. Moore, southern California district, including Hawaii. Bradner has F. L. Meredith for Washington and Montana; Ray Galyon for Oregon and Idaho; Francis Craddock, northern California and Nevada; Harry S. Mills, southern California; Howard Johnson, San Diego and Imperial Counties and Arizona; R. M. Roberts, Colorado, Utah and New Mexico. Winston's appointments have not been announced. . . Other news: Chester F. Gilbert, former San Francisco banker, has been made vp and gm of the new Westinghouse Credit Corp.

High gear

Men and positions: Al Gilbert, former manager of promotions for Idaho Power Co., becomes sales manager as Earl Olson moves to the Boise division as assistant division manager. . . W. C. Smith was made residential air conditioning specialist for Phoenix division of Arizona Public Service. . . R. H. Friedel has been named West Coast regional manager for Chrysler Airtemp succeeding Everett Ham, who is now Pacific Northwest regional manager. . . Norman Hayes, former district appliance sales manager for Graybar in Seattle, has joined Hotpoint as zone manager covering Portland, Ore., and Boise area. R. Lloyd, former district sales manager at Houston succeeds Hayes in Seattle. . . W. H. Anderson, who was such a hit in the Frigidaire show that made the Far West circuit this year, former appliance zone sales manager at Dayton, is now appliance sales manager for the Los Angeles branch of Frigidaire Sales Corp. . . . Marvin Dahl has been appointed West Coast district manager for Ben Hur Mfg. Co. succeeding E. F. Jackson, now Western regional sales manager. . . Don Perry, once in charge of industrial sales for Telechron, has just been named clock sales manager by G-E. . . In Portland Ralph Montag Jr. appointed D. Eugene Parks sales manager of Montag Stove & Furnace Works. . . R. C. Starke is now Colorado, Utah, New Mexico Remington Corp. representative.

New jobs

Other TV briefs include: Hoffman Radio Corp. is building a new TV station, Channel 13, on Mt. Diablo, back of Oakland. It will reach into San Francisco Bay area as well as San Joaquin and Sacramento Valleys. . The first UHF station in San Francisco, KSAN-TV, will be devoted exclusively to sports. Already it has boosted UHF set and converter sales. . . Chromatic Television Labs, Oakland, making the Dr. E. O. Lawrence color tube, has announced to set makers it will make a 20-in. rectangular glass tube.

Had you heard?

The managers of electrical leagues will meet for the IAEL annual conference in Philadelphia, at the Bellvue-Strafford Sept. 29 to Oct. 2. Last year the first such meeting in the West was held in San Francisco.

Fall date

Thermador has added a new 4,000-cfm bottom-discharge evaporative cooler to its line, designed for roof mounting. A new console range line also announced includes a 20-in. range with 3 or 4 fast surface units, full-sized oven, as well as 30- and 40-in. models.

Ready for sale

Robert Galvin of Motorola told of TV and radio, and a manufacturers' question panel dealt with appliances, policies, prospects

Touchy Questions Tackled

Revealing answers came to the pointed questions put before a manufacturers' question panel that shared the honors with two feature speakers and a color TV demonstration when some 500 dealers and distributor people met for the annual winter conference of the Bureau of Home Appliances at San Diego Feb. 24. W. I. Buchanan, Western regional manager, Frigidaire Sales Corp., and Robert Galvin, executive vice-president, Motorola Inc., were the two headline speakers.

On the manufacturers' question panel, these participated: Walter Baker, Western regional manager, Westinghouse Appliance Division; Maury Breslow, vice-president and general manager, Gaffers & Sattler, Utility, Occidental and Mission Water Heater Co.; H. G. Dillin, executive vice-president, San Diego Gas & Electric Co.; Charles E. Moore, Western regional manager, Sunbeam Corp.; Otto Zwanzig, American Gas Assn. director of promotion. J. Clark Chamberlain, bureau manager, was the moderator.

Dillin saw no drastic reduction in the Navy or aircraft pay roll in the area and promised plenty of power from the company's big construction budget. Barnes said that freezers would again sell well but it would be appliance dealers instead of food plans that sold them. New appliances of many kinds were predicted by Moore. Baker urged getting away from selling an inflated trade-in value and a return to selling the new appliance on its own merits. He also foresaw a changing attitude among lending agencies regarding open-end mortgages. Moore declared supermarkets never could really sell electrical housewares because they took demonstration, were not pickup items.

Future radical gas range changes were hinted by Breslow, who also declared that in southern California gas ranges still sold 10-to-1 electric. Zwanzig described the forthcoming clock-controlled gas range campaign and the gas incinerator potential.

Robert D. Halvorson, president, commended Program Chairman Ed Nystrom and Vice-chairman Taylor Brown and committee members for the excellent program.

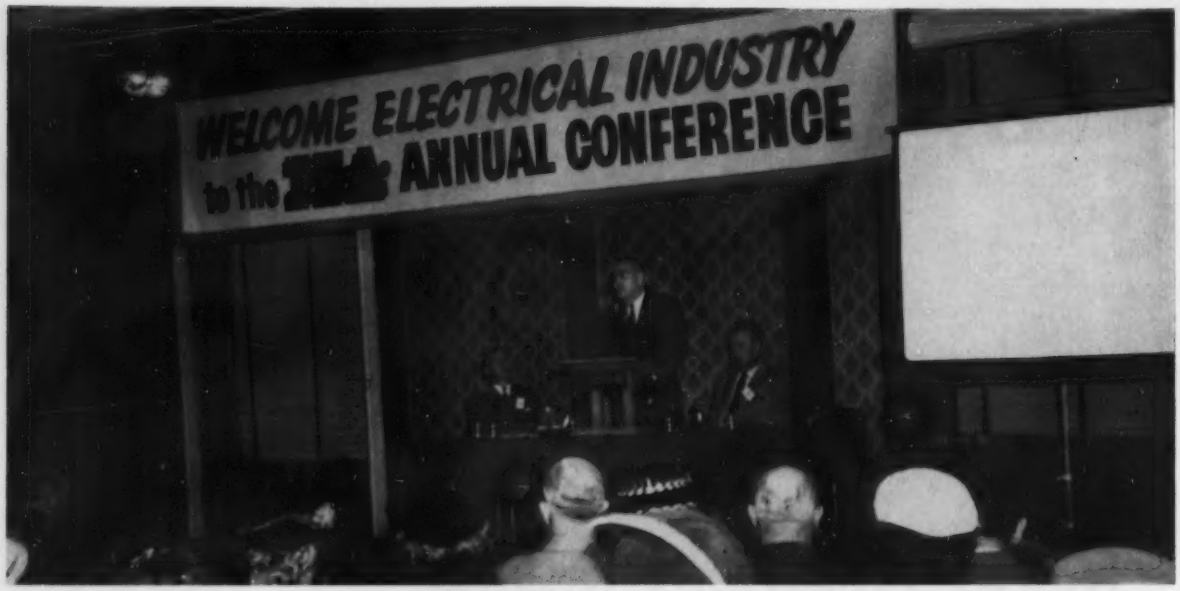
Giving cause to believe that television set sales will get better and better, said Galvin, are several factors evident in the industry today: low inventories, another 150 to 200 new TV stations in 1954, low prices that are proving to be an incentive to customers, expectation of better margins for the dealers and distributors and an interest in purchasing black and white sets when color TV has been discussed and demonstrated intelligently.

Galvin told the conference that recent progress in the development of a 19-in. color TV tube will most likely revise downward the expected 1954 production of color sets using the present production tube. He told the dealers that they would likely see a demonstration of 19-in. color TV on the West Coast within six months.

Dealers should not overlook the opportunities that radio set sales present, said Galvin. He pointed out that radio is still a very important commodity with 1954 sales expected to be about 7,500,000 units. He saw an increasing opportunity for dealers in the sales of auto radios during the coming months because the auto manufacturers will be installing less radios in their 1954 models. He said that dealers will be wise to remember that 40% of all radios are purchased as gifts, and that they lend themselves to promotional techniques.

Buchanan took a statistical look at the future to emphasize his contention that the appliance business is destined to increase. First he pointed out that 11 appliances that were not on the market in 1940 accounted for "over a billion dollars worth of business in 1953, or more than the entire appliance business in 1940." In addition, he said, there are three appliances that accounted for only a negligible amount of business in 1940—automatic washers, room air conditioners, power lawn mowers—and which by themselves represented a volume of over one billion dollars in 1953. With that pattern in mind, and the anticipation of more new and improved products for the industry to develop and merchandise, Buchanan looked to 1960 when he anticipates a national population of at least 175,000,000, an increase of 10,000,000 wired homes and an annual average home use of electricity of about 3,800 kwh.

The bureau's annual winter conference program included presentations of the bureau's advertising and promotion campaign for 1954 by J. Taylor Brown, Dohrmann's, and Forrest Raymond, San Diego Gas & Electric Co. The association's elaborate sales training program was described by Ivan Lauritzen. A discussion and demonstration of color television characteristics was given by Richard Silberman and John Day of Kalbfell Laboratories, San Diego, with color TV receivers supplied by local distributors.



E. M. Naughton, UP&L general manager, spread a background of industrial expansion and plentiful power supply against which . . .

IEA Seeks Out Sales Opportunities

It encompassed everything from the industrial future of the region, through the power facilities to serve it, the planning and equipping of homes, electrical farm uses, the home building potential and wiring and rewiring, dealer profit and color television, and was topped off by inspiration as to the meanings of freedom. The annual conference of the Intermountain Electrical Assn. at Salt Lake City, March 9, under its new president, Mark Brown, a home furnishings dealer, was the largest and probably the best in many years. Some 250 attended the banquet, overflowing the hall, and daytime conference attendance averaged 200.

The industrial and employment and hence business outlook for the region was summed up by Gus Bachman, Salt Lake City Chamber of Commerce executive secretary, when he reviewed the potentials for coal, oil shale, gas, petroleum and Colorado River power in the 300-mile radius. "Private enterprise can do the job and we are the salesmen who can do it," he declared, saying that with raw materials, power and people the region can develop a better economy in peace than under wartime.

More of the industrial future of the area was covered by Edward M. Naughton, vice-president and general manager of the Utah Power & Light Co. With engineering thoroughness, Naughton reviewed the industrial potentials in the whole region and the company's program to meet the power demands. "Our own Intermountain region is rich in raw materials. It has sufficient water available or in sight. It has plenty of fuel, of almost every known kind. It has copper, steel, lead, zinc, petroleum and many other industries. It has an adequate, competent and growing labor force. Our company recognizes its responsibility to provide electricity to meet a vigorous and prosperous future facing our region," said Naughton.

Mark Brown, IEA president, and Dr. Cutler

That the planning and equipping of the home is a 20-year task and that young people should be taught to regard it as such was unfolded in a very human fashion by Dr. Virginia F. Cutler, head of the home economics department of the University of Utah. If the average of $500 spent on a big wedding and hundreds of vases and casseroles for presents could be directed instead to usable and practical home equipment needed in such a 20-year program, the sense of possession and stability developed, she felt, would have a great influence on reducing the number of broken homes and divorces. She suggested that cooperation with the university in such a goal would lessen high pressure in selling young people things not fitted into their long-time plans.

Electricity is thought of in terms of the physical assistance it gives a farmer, Henry A. Dixon, newly installed president of Utah State Agricultural College, told the conference. Before touching on many of the cooperative projects that the committee on rural electrification is carrying on, he touched on the spiritual values and the contribution electricity makes to freedom. Projects mentioned included publication of information on maintenance of electrical equipment, milk cooling, adequate wiring for farms, making of

surveys of farm equipment, assisting in planning of farm shops, offering of scholarships, work with 4-H groups and similar projects.

Two different approaches to the adequate wiring problem were taken by L. B. Johnson, Construction Material Division, General Electric Co., and William A. Cyr, associate editor, ELECTRICAL WEST, in two separate talks. Johnson described the use of the new cards and promotion material of the National Adequate Wiring Bureau and told of the association's own activity. There were 202 certificates for adequate wiring granted last year, he reported. Cyr recounted the experience of the Northern California Electrical Bureau with its television spot program, showed some of the TV spots and urged a program be developed for the rewiring of old homes that the response indicated was ripe for development.

What a tremendous market there is in housing—new homes for new families, remodeling of 25% of the existing homes and the junking of another 25% was told by Allan E. Brockbank, a local builder and former president of the National Association of Home Builders and an advisor to General Eisenhower. "At the rate we are getting rid of the old and replacing or repairing, we won't get around to the one that is built today for 620 years," Brockbank said. He told of a new national organization formed for the remodeling, rehabilitation and redevelopment and urged full participation by the electrical industry. The building industry is the only one that can take up the slack from the loss of the defense program employment and volume. He predicted that houses would be traded in like used cars and urged changing of ordinances to permit the redevelopment of blighted areas in the cities.

Toying with a fundamental of selling and distribution, said A. L. Duckett, an appliance and automobile dealer of Provo, has caused the present chaos in the appliance business. He maintained that the "business of business is profit" and that factories and distributors in desperation to move the volume produced were failing to consider what happens to the established dealer that is the backbone of their distribution. In 1953 he said no one sold an appliance, he sold a deal. Today everyone is a discount house, yet more overhead and lowest gross margin is bringing about a low dealer morale that is "the grumbling of dissatisfied capital." Without profit there is no business, he maintained. As a cure, he advocated the development of a real quality program both in dealerships and in appliances and services. He ended with a plea for a new pledge of loyalty between manufacturers and distributors and dealers who are really partners in enterprise and should share in the profit. Such a relationship, he felt, would put the guidance of production capacity in the hands of the consumer.

W. Cleon Skousen, assistant to the president at Brigham Young University, gave a clear-cut debunking of the 10 misconceptions prevalent in America concerning the nature and purpose of communism.

Two early morning color telecasts were viewed by many members of IEA at the KDYL studios, prior to the IEA meeting. John K. West, NBC vice-president in charge of the Western Division, Los Angeles, brought the area up to date on the status of color television with particular reference to the Salt Lake area at the banquet that night. He declared that Salt Lake City now has color telecasts about twice a week, since Dec. 27, and told of the experimental program of broadcasting carried on by NBC this year. The 100,000 sets that will be built in 1954 by all makes will scarcely fill the pipelines, he said, but by 1955 about a half million sets will be made and by 1956 two million units.

Interesting sidelight was that NBC will rebuild one of its studios in Burbank for colorcasting at an expense of about $1,000,000. That color will enable the industry to start all over again and give it a second chance at a billion-dollar business was his optimistic forecast.

School buddies W. A. Huckins, Dr. Dixon

Committee Commended

Sharing in the presiding over the meetings with President Mark Brown were Louis D. Bowring, president of the Ogden Chapter, and Lewis A. Dahl, president of the Salt Lake Retail Chapter. Lennox Murdock, vice-president and manager of KSL-TV, was unable to be present on account of illness and Brown presided at the banquet. George Earl, Utah Power & Light Co., chairman, and A. M. Stephens, Wasatch Furnace & Appliances, vice-chairman, and a program committee under Murdoch were commended highly for the program and arrangements that made the conference such a success. The ladies attending were given a special treat of a visit to the new home living center at the University of Utah, under the direction of Dr. Virginia Cutler. Unobtrusively handling the multitude of details and arrangements was James Schricker, managing director.

Louis Dahl, retail chapter; Allan Brockbank, builder, and Brown

Gus Bachman, Chamber of Commerce; George Earl, meeting chief

Women against men in the finale of Montana Power Co.'s contest that launched its 1954 program tied in with Light's Diamond Jubilee, as sales programs and promotions are . . .

Bursting Out All Over

Like the Marines coming to the rescue the power companies and the electric leagues of the West are moving up artillery of promotion and advertising to give needed aid to the dealers, faced as they are with the stiffest consumer resistance in many a year.

Here in brief review are some of the things they are doing to batter down the resistance and to help make more appliance sales for dealers.

Montana Power Continues Rural Sales Campaign Through '54

Wrapping up its 1954 selling drive in the celebration both of Light's 75th Jubilee and Montana Power Co.'s own 75th anniversary, that company has already launched its 1954 campaign with a "battle of the sexes" cake baking contest show at the annual farm and home week in Lewistown. More than 600 watched the bake-off and 5,000 were given a sales story during the week by Edwin R. Buck, dealer distribution relations man, Mrs. Bertha Wieloff and Doris Dickinson, home service advisors from Lewistown and Havre, and Bard Brown, customer service advisor, Lewistown.

Baking a cake the volunteer contestants each day were eliminated until the final contest, with two men winning third and fourth prizes for the week. This event starts the rounds of shows for the year similar to the Room of Amazement shows last year used to spark interest in the rural sales campaign. It also ties in to the jubilee activities the company will stage this year.

A portable background of 11 pieces is used in all the shows, with changes of copy on the lamp bulbs and center piece to adapt to the particular event during the year.

Results of the successful 1953 rural sales campaign were announced briefly by D. J. McGonigle, general sales manager. A total of 35 carloads of electrical equipment was sold by the dealers to farm customers. This included 718 water heaters, 653 ranges, 461 freezers, 338 water systems and 213 dryers, a total of 2,383 units, to an eligible total of 12,628 customers. The sales did not come up to the quotas, some divisions doing better than others. Missoula area did the best with 67.3% of quota; Bozeman was next with 63. The average for all divisions was 55.4%. Quotas were based on the number of farm customers qualified as eligible. Coupons entitling them to a $25 allowance on ranges or water heaters, $10 on freezers, dryers or water systems, were offered to those eligible, who could apply them on purchase of the appliance from any dealer. The dealer in turn cashed them in with Montana Power. The coupon redemption represents a cost of $44,645 to the company to gain $65,494 in added annual revenue.

It's Dryers in Denver

Although Denver *Post* takes most of the credit for it the dryer - a - day contest in Denver was sponsored jointly by the Rocky Mountain Electrical League, Rocky Mountain Gas Assn., the *Post* and 17 distributors of gas or electric dryers. It ran from Feb. 19 to March 11. Some 75,000 people entered the contest, picking up a blank from a dealer store of the *Post* and writing 25 words about what a dryer would do for them. A dryer prize was given each work day.

The two associations launched the biggest promotion in years at a meeting of 250 dealers and salesmen at Holly Service Center. Two skits contrasted the old-fashioned way to dry clothes and the way to sell an automatic dryer. Fourten electrical contractors agreed to install the wiring necessary for a flat rate of $40. The difference in price between a gas and an electric dryer just about pays for such wiring. Electric dryers were purchased by the majority. Denver *Post* ran stories daily and put out a special dryer section on Feb. 18.

Seattle Aids With Wiring

A credit of $55 toward the installation of electric range and water heater in houses not now using electricity for cooking and water heating is again being offered by Seattle City Light, its new Superintendent Paul Raver announced March 8. For a range the allowance is $30, for a 50-gal or larger water heater $25. The latter also applies where customers change from side-arm or flat-rate type to automatic-tank type. The offer is handled through electric appliance dealers and plumbers. Last year a similar offer, Raver said, stimulated the sale of 1,668 ranges and 2,285 tanks and brought 220-v wiring and the lower all-electric rate to encourage customers to buy other appliances.

Sacramento Repeats on Ranges

Another "I want an electric range because—" contest is being conducted in Sacramento by the Sacramento Valley Electric League and the Sacramento Municipal Utility District. Last year some 3,000 entries were made and sales were materially boosted by the promotion for months. This year 15 electric ranges have been provided to give as prizes instead

of 12 last year. A strong advertising program supports the campaign. This promotion was preceded by one on home lighting.

Chelan Aims at Two-Wires

With about 1,700 two-wire meter customers on its lines, Chelan County Public Utility District in Washington is offering its customers and dealers an assistance program called a Limited Rewiring Finance Program. It has mailed to each of the 1,700 two-wire customers a letter offering to the first 10 who respond and agree to rewire their homes and install a new electric range and automatic water heater that it will finance the wiring on a repayment contract. The respondent must be a customer of the district and have acceptable credit. The customer also must get a contract price from a wiring contractor or an estimated price with a maximum escalation of 25%. The customer agrees to pay $10 down and the balance in 20 equal monthly payments without interest.

In addition the district accepts from cooperating dealers the first 100 letters turned in to them by customers on the purchase of a new range and water heater at half the quoted allowance in the letter. The letter offers the customer $20 on a range and $20 on a heater. Thus the district reimburses the dealer $10 for each if he is willing to make the other $10 allowance to the customer. The help of Mrs. Mae Hughes, home service representative of the PUD, in coordination of dealers and contracts, wiring bids, etc., is offered, according to Kirby Billingsley, PUD manager.

UP&L Boosts Replacement

Aiming to keep its customers range happy with electricity, the Utah Power & Light Co. sales managers were loaded with a new kind of selling campaign in a meeting with W. A. Huckins, sales manager, March 10. They were sent out to their divisions to enlist all electric dealers for an April and May replacement campaign. With more than 80,000 electric ranges on its lines, 54,000 of them sold from 1912 to 1942, and some ranges as old as 40 years still in service, the objective is to replace them with modern up-to-date electric ranges and to scrap the old ones, removing them from the used-range market.

To do this UP&L and Western Colorado Power Co. offer a $25 trade-in allowance on old ranges when a new one is purchased from a retail dealer. The allowance is given the customer by the dealer. The dealer delivers the old stove to the power company. The range must be one actually in use by a customer. The dealer attaches a gummed label furnished by the company on his invoice to the company and the old range tag, with similar information as to name and address of user, brand of new range sold, date of sale, type of old range and dealer's address is affixed to the range turned in. The utility then pays the dealer when invoices and tag are checked.

A big advertising campaign, to which dealers are urged to tie in and newspapers are furnished mats for dealer ads, as well as banners, billboards, radio and TV spots, supports the campaign.

This new campaign was announced to the trade on the very heels of the company's series of dealer meetings (23 of them among the divisions, attended by 1,007), a distributors' meeting with 103 attending, and seven company personnel meetings to present the sales program of the year. The company's new picture presentation in its book, "Sell More in '54," was explained concisely by Huckins, and LaMar Holt at most meetings and at some Evelyn Hansen, home service director, gave a new adequate wiring presentation that the home service girls are using.

Telluride Buys the Materials

A range campaign with a wiring offer starts in April and runs to May 15 in the area served by Telluride Power Co. of Richfield, Utah. The dates and conditions were set up in meetings of a dealer association in cooperation with W. O. Cluff, sales manager. In the plan the company pays for the wiring materials to wire in a range and the dealer pays for the labor. Dealers who do no contracting themselves arrange with a contractor for it. The offer applies on the sale of either new or used ranges as long as the wiring is necessary. With a saturation of over 60% of electric ranges this is not often needed.

TV Saturation Drive

"The air is full of things you can't afford to miss," slogan of the saturation promotion initiated by the television committee of Northern California Electrical Bureau, will be seen everywhere in the area served by Pacific Gas and Electric Co. and Coast Counties Gas and Electric Co. throughout April. Every TV retailer will be contacted by letter first, then in person by PG and E dealer representatives with mats to use in their own ads and banners to place in store and window, singing this slogan. PG and E will run large ads, usually 60 in., in all newspapers where there is TV reception. Newspapers have been alerted to get dealer tie-in ads. All this is designed to give TV the spring tonic in sales it always needs in April; this year more than ever.

About June an electric range promotion is being planned.

Arizona Gets Everybody Into Act

With a 3-D approach to selling problems for 1954, Arizona Public Service Co., Phoenix, has everyone in the act—its employees, the sales staff, the Appliance Merchandisers Assn. of dealers, and electrical contractors for its wiring modernization financing plan. The program is so big that it is to be featured as the sales story in our Convention-in-Print in the June issue. It involves an employee purchase plan that works and dealers like, wiring financing, a continuous program of promotions, shows, events and a sales training and dealer-help plan that coordinates with it. Don Willis, general sales manager, has promised us the works. In April the promotion is the Appliance and Air Conditioning show at the state fair grounds, April 8-11, which will be opened by the PCEA Business Development Section meeting in Phoenix, noon, April 8.

Heat Pump Schools

Growing importance of the heat pump is recognized by Southern California Edison Co. by replacing Vic Soper, residential engineer who did such an outstanding job in promotion of adequate wiring, in charge. Soper attended a special course at the General Electric Co. factory and now is holding schools for the residential staff, power consultants and other commercial staff members of the company and its divisions. There were four schools in March. Surveys show that window air conditioning really has begun to move in southern California and 1954 is expected to be a big year in sales of these units. Meanwhile some 50 heat pump installations have been sold in the past six months for year-round air conditioning.

Work has begun also on the rehabilitation for reactivation of the Electric Living Centers in division offices. The first will open May 1 in Pomona, next Ontario about June 1 and San Bernardino July 1 and the others as rapidly as possible, says H. C. Rice, sales manager.

ELECTRICAL WEST

Another Race with Russia

THIS nation's present shortage of engineering and scientific graduates was cast in a new light at last month's record-breaking conference of the PCEA Engineering and Operating Section. M. P. O'Brien, dean of engineering at the Berkeley campus of the University of California, gave this significant warning:

"Russia is graduating 50% more engineers today than we are. Their educational system is severe. Admission requirements cover material up through the first year of our college curriculum. Their engineering program is a five-year one—three years in a general technical institute followed by two years of study at a specialized institute for those especially gifted. With that kind of a program and 50% more graduating engineers in a single year, I think that we should take heed."

The training of competent scientific and technical people is a race we cannot afford to lose.

Time for Action

CONGRESSIONAL legislative or administrative approval of some of the splendid cooperative programs for water resource development here in the Far West is badly needed if the full benefits of the Eisenhower administration's power policy are to be realized. Since enunciation of the policy of local-federal cooperation, many proposals have been developed. These range from the relatively small City of Eugene-U. S. Engineers power and flood control project on the McKenzie River to the five-company undertakings on the Clearwater River in the Pacific Northwest and the nine-company proposal relative to the Colorado River storage project.

Implementing the principles of cooperation with the necessary legislation to set them in motion is becoming increasingly essential. Unless planning can commence soon on projects in the Pacific Northwest, that region will once more be threatened with short power rations. In the case of the Colorado River Storage Project, the companies involved must gage their long-range planning on fuel-burning power plants if the hydro power projected for that undertaking is not to be made available.

Unless there is action in the national capital soon the hope that has now turned to impatience may soon become despair.

To Test More Atom Bombs

ANY technically minded person who saw the pictures of what heat and blast from a 15-kiloton atomic explosion did to an ordinary house on the Nevada testing grounds a year ago must have wondered what would happen to various engineered structures and to various kinds of equipment. The next series of continental tests at Frenchman's Flat less than a year hence will be designed to demonstrate the effects of atomic explosions on all kinds of industrial structures and equipment. The Federal Civil Defense Administration is setting up a cooperative atomic test program that will provide badly needed basic information on the measures that might be taken to minimize the loss of property that an atomic explosion might cause.

Industry participation in future tests will assure electric utilities and electrical manufacturers of an opportunity to learn much about how utility structures and equipment will fare in case of an atomic blast and should indicate how protective measures might be applied. The FCDA is inviting industry cooperation in the sponsoring, planning and assisting in the conduct of technical tests and demonstrations of interest and value to both industry and civil defense. Such sponsorship might involve full participation in a particular test or tests, including construction, support, instrumentation, transportation and post-shot analysis. Or industry might provide the materials only, with FCDA doing all of the rest.

The data that such tests will develop are

EDITORIAL VIEWS

badly needed by industry for its own planning and protective purposes. Fact is, it may even now be too late for such information to be of much practical use. The evidence pointing to the utter and complete destructive power of last month's thermonuclear tests in the Pacific heightens that possibility.

Death from Taxes

IF it can be said that the two sure things of life are death and taxes, a corollary could well be added that taxes can be the death of business and certainly of incentive.

Easing of the excise tax on such things as appliances may be hailed as welcome relief and an aid to business at a time when customers have become reluctant. The extra that various governments take in sales and excise taxes over the price of the article itself is a discourager of purchases. Perhaps easing that much in taxes may make it a little easier to make a sale.

The disconcerting aspect of the excise tax was that it was imposed as a war measure "to discourage purchase of luxuries" during that time. Yet, with the war over and the making and selling of so-called luxuries a very necessary part of the whole economy, the reluctance of Congress to remove the tax shows that its original purpose was not honest; that it was taxes the government wanted. And war or no war it still wants the tax. It might as truly be added, it wants it, business or no business.

In some cases the revenue from the tax has reached a point of diminishing returns. The tax reduces sales and without sales there is no money to pay taxes. In some other parts of the world heavy taxes have actually killed off small business and made government monopolies of the necessities of life. These have created black markets and turned everyone into tax dodgers. In some cases the country's industries end up totally in the export business because its own people cannot afford to buy the products they make.

Congress has to be watched and told that the excise tax was not intended to be a permanent thing, no matter how tempting the idea of keeping it as big source of revenue. When the emergency that gave it some reasonableness ceases to exist in honesty it should be removed. If it is not it may in itself create another kind of emergency in business and employment that depend upon the freer flow of goods and services from maker to user.

Why not try a little more government economy instead?

You Can Say That Again

THE total tax bill again, as in the previous year, was more than double the amount of employee remuneration, and it was nearly 2½ times the total dividends to shareholders . . . The size of our tax bill and its relationship to wages and dividends emphasizes to shareowners of business, as well as to employees and customers, how important it is that the expenditures of government be lowered to the maximum extent consistent with national safety, in order that taxes may be correspondingly reduced. It does not suffice for citizens to give lip service alone to the principle of economy in government at all levels. It requires willingness to forego unnecessary expenditures of government, desirable as they may seem to be from a local or temporary standpoint, in the interests of preserving the national economy. It requires giving active support to our elected representatives and to responsible government officials who insist upon proper economies. And it demands that tax money shall not be used for purposes which can and should be accomplished by investor-owned, tax-paying enterprise.
—T. E. Roach, president, Idaho Power Company.

O'Brien Pengilly

Longley Johnson

Phillips Brinton

PCEA E and O Meeting Breaks All Records

All records for attendance at a meeting of the Engineering and Operating Section of the Pacific Coast Electrical Assn. were broken by a ratio of almost two-to-one at this spring's conference held in San Francisco. Registration was 763 for the meeting held March 18-19. Meeting rooms bulged at the seams at times but all in all facilities at The Mark were quite adequate, especially for the two noon luncheons that drew more than 500 each.

High light of the conference was an address by Morrough P. O'Brien, dean of the college of engineering of the University of California, Berkeley. The dean had chosen as his subject "Modern Aspects of Engineering Education." He ascribed the present shortage of engineers to the low birth rate during the depression years.

In the 1952-53 school year, there were 24,000 engineering graduates to meet a steady-state need of 30,000 a year. Accumulated deficit is now 50,000, which in his opinion will never be made up. But in the next few years we will catch up in the relationship between supply and demand, and any problems of shortage will disappear. Dean O'Brien made a number of strong points in his enthusiastically received address. One point in particular was food for sober thought. After firmly establishing the rate of advance of a nation's productivity is more dependent upon the availability of graduates in applied science than any other factor he said, "Recent studies of the Russian situation are to the effect that they graduate about 50% more engineers per year than we do; second, their educational system is rather severe—their admission requirements cover the material up through our first college year; their engineering education is a five-year program, three years in a general technical institute and two years of study at a specialized institute for those especially gifted. With that kind of a program and graduating 50% more engineers in a year than we are, I think we should take heed."

At a second luncheon Dr. J. H. Hobson, director of Stanford Research Insititute, spelled out as he sees it the need of the electric utility industry to engage in a long-range basic research program. This it should do, he said, if it is to keep abreast of the large research programs of other industries; if it is to meet the competition of other sources of energy, explore new energy sources, improve operations, develop new techniques; and if it to fulfill its obligation to the public. He feels that for a minimum start on basic research $7,000,000 should be spent. This is $1 for each $1,000 of revenue of 7.5c per kw of installed capacity. Such a research program would secure the future of the industry and would have a salutary effect on the recruiting of needed scientific manpower, said Hobson.

General plan for the conference group meetings followed a different pattern than in previous years. It had been the practice of each of some 10 groups to meet separately. This year the guidance committee, under J. A. Longley, Allis-Chalmers, wisely planned for the combining of two or more groups to participate in a program of mutual interest to all. In this way the value to the conference to those attending was greatly enhanced and, moreover, it cut down the large number of parallel meetings. General acclaim was that the conference was an outstanding success and that the member utility companies were well repaid for the large delegations sent. J. H. Pengilly, PCEA president, had opened the meeting by saying "Customers are demanding better products and more services and the engineer has the responsibility of providing these."

Following will be found a summary of meetings of the several groups.

Accident Prevention

C. W. Eddy, Sponsor

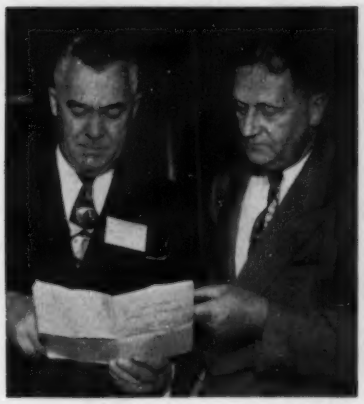
The accident prevention committee did not meet separately. Members attended other group meetings and participated in discussions.

Communication

T. A. Phillips, Sponsor

Mixed use of microwave channels for relay, communication, telemetering and supervisory control was discussed by K. E. Dueker, Southern California Edison Co. He concluded that microwave was very attractive for mixed channel use, particularly when several circuits were required. There was considerable discussion as to whether the Army would elect to shut down microwave installation during an emergency. However, a definite answer was not available.

W. U. Dent, Westinghouse Electric



Eddy Hunt

Lindstrom Ridgway

Werden Fisch

Corp., covered the future of power line carrier vs microwave. He cited a number of cases where utilities had used all available carrier channels and had resorted to microwave. The present trend seems to be to use existing carrier facilities for relaying and use microwave for communications, supervisory and telemetering.

L. E. Ludekens, Southern California Edison Co., in discussing stand-by power sources for unattended radio and microwave relay stations said there are several different methods in use: gasoline-driven units, propane- and butane-driven units, diesel driven units, a-c m-g units with and without automatic clutch connected engines, and combination battery and m-g units. The only conclusion was that for heavy-duty service at isolated spots the diesel unit may have merit.

On the subject of frequency allocation and interference problems in connection with carrier current applications, Ludekens concluded that the recently formed carrier current coordination committee would be very helpful in recommending new and reassigned carrier frequencies.

In another presentation, he suggested ways and means to reduce man-made television interference.

R. L. Mayer, PG and E, demonstrated a system of graphical analysis applicable to communication circuits that will enable making a one-line representation. The system appears to have a tremendous advantage in the communications field. Mayer also discussed the use of transmission measuring sets in the maintenance of communication channels and cited various pieces of new test equipment.

R. L. Brinton, PG and E, related his experiences in maintaining microwave equipment and prompted considerable discussion on the most economical way to maintain such equipment.

Engineering Design

W. J. Lindstrom, Sponsor

Program of the engineering design group consisted of joint meetings with other groups. There were no independently sponsored meetings or speakers, therefore all meetings of this group are reported by other sponsors. This permitted a design engineer to attend those meetings of particular interest to him.

Hydro Generation

A. C. Werden Jr., Sponsor

Developments leading to the construction of Vermilion Dam, located on Mono Creek, a tributary to the south fork of the San Joaquin River, were traced by T. M. Leps, chief civil engineer, Southern California Edison Co.

Actual work was started in 1953 and completion is planned during 1954. To date slightly less than half of the approximately 5,000,000-cu-yd earth-fill material has been placed.

Earth-fill construction was determined to be the most economical because the deep moraine in the valley floor, well compacted during the glacial period, provided an excellent base for the mile-long structure, with suitable fill material near by. This material is moved from the barrow pits in 23-cu-yd carryalls that travel at 25 to 35 mph over well maintained highways. Up to 25,000 cu yd have been placed in the dam in a single day.

Crews constantly sample and test the material as it is being placed to determine that compaction is sufficient and that moisture content is correct. Approximately 4,000,000 fbm of lumber will be salvaged from clearing operations, some of which is being used locally for dam construction. The remainder is being hauled out by lumbering interests. Storage capacity of the reservoir will be about 125,000 acre-ft. The stored water will be used through existing generating facilities of Edison's Big Creek plants.

Failure of the needle on a valve at the high-head Poole plant of California Electric Power Co. was discussed by H. Evans, assistant superintendent of hydro generation. The failure, resulting from metal fatigue, burst the penstock in three places and caused approximately $65,000 total damage to the plant.

More serious damage was fortunately averted by reason of the flood water coming down a draw to one side of the plant. It was also fortunate that no damage occurred to the water wheel or generator other than water wetting the generator winding. It was concluded that needle stems should be observed and possibly magnafluxed occasionally, particularly in the type of construction where long needles are supported in cantilever and consequently subjected to hydraulic vibration fatigue.

High-voltage d-c testing of winding insulation on rotating machinery was discussed by C. L. Sidway, senior apparatus engineer, Southern California Edison. He said that d-c testing can be controlled to cause less damage to insulation, predict the voltage level at which failure may be expected, determine condition of insulation without suffering breakdown and make possible estimating the remaining life of insulation. A case was cited where the d-c test possibly postponed a condenser rewind, resulting in more economical operation.

G. L. Hill, PG and E, said that his company has developed d-c test methods and characteristic curves to the point where it now resorts to d-c testing exclusively on large rotating equipment. E. A. Crellin, PG and E, commented to the effect that he be-

Davidson Peter

Ingraham Wilson

Collins Smith

lieves d-c testing to be far the most reliable method of determining when rotating machine windings should be replaced. He further pointed out that d-c tests have precluded the need for dry out of new windings in many instances on the company's system and consequently saved many thousands of dollars in outage time and replacement energy costs.

One of the unsolved problems lies in the fact that a definite a-c—d-c breakdown relationship has not been determined as yet.

P. Dawson, Pelton Water Wheel Co., W. J. Rheigans, Allis-Chalmers Mfg. Co., and J. Fisch, S. Morgan Smith Co., presented data on "Fatigue Limit Design and Factor of Safety in Water Wheel Buckets and Disks." From field tests made by Pelton and Allis-Chalmers of buckets in operation, it was noted that the measured centrifugal and jet stresses generally were found to be either about the same or less than calculated stresses.

Variations of water wheels manufactured by these three companies include bolted wheels with cast or fabricated buckets and integral cast wheels. Allis-Chalmers recently furnished an integral fabricated water wheel for the San Bartolo plant in Mexico.

No single-type impulse wheel has proved superior for all operations, but apparently each can be adapted to particular applications. It was noted that the stresses and fretting corrosion problems introduced on the bucket lugs and bolts of bolted wheels can be reduced or eliminated by use of integral cast wheels. However, good integral castings are difficult to obtain. The best of foundry practices and close cooperation between the manufacturer and the foundry are essential in obtaining acceptable products.

It was pointed out by Dawson that some water wheel installations have given good service for many years where the design stresses are considerably above those acceptable to them today. He believes that good distribution of the stresses may account for the long life.

Rheingans gave a description of the impulse turbine installation at the San Bartolo plant in Mexico. The six-jet vertical turbine has a gate shaft governor and a servomotor for each jet that permits use of any combination of jets. The water wheel is integrally fabricated.

G. D. Smith of the G. D. Smith Co. talked on "Sonic Investigation of Cracks in Water Wheel Generator Shafts, Water Wheel Buckets and Disks." He said that ultrasonic tests on water wheel equipment has proved successful in detecting cracks in areas inaccessible or difficult to inspect by other means of testing. A description was given of recent tests on Edison and PG and E equipment.

Some difficulty may be experienced in making tests on complicated cast or fabricated pieces of equipment but an experienced technician can usually determine a pattern of reflection, and any deviation will indicate probable defects. It was noted that this type of testing is popular with many manufacturers, including those that furnish hydraulic turbine equipment, as evidenced by comments from Rheingans, Dawson and Fisch. Ultrasonic testing is especially adaptable to large shafts, bolt stock, steam piping, etc.

D. D. Dutter, resident engineer for the Southern California Edison Co. at the Hoover plant, spoke on "Corrosion Protection of Wicket Gate Stems With Stainless Steel Sleeves." Corrosive action of the water at Hoover caused the exposed sections of the wicket gate stems to rust and pit badly.

First repairs in 1948 were made by machining the journals ⅛-in. undersize, welding with stainless steel overlay and then remachining to the original diameter of 8 in. Some distortion of the stems resulted from this operation, requiring considerable time to straighten.

Adaptation of split stainless steel sleeves to the corroded areas on more recent repairs to other turbine wicket gate stems was occasioned in part by the necessity of reducing generator outage time to an absolute minimum. The sleeves proved better and more economical, and a reduction in unit outage time was effected. The sleeves were pressed in place on the undercut stems and welded under compression. Edges were welded to seal against moisture that might cause trouble in the future.

Meter Group

A. D. Irion, Sponsor

Subjects given detailed consideration were as follows:

1. Are present watt-hour meter ratings adequate for loads of the future?
2. Causes of failure of watt-hour meters in service.
3. Application and field experience of miniature current transformers.
4. Meter test tolerances.
5. Minimum educational requirements for starting level of metermen.

With the extended overload range of 600% it appears that the present long-life, 15-amp domestic meter will accurately meter domestic loads for some years to come.

Failure experience of watt-hour meters in service reveals that normal overloads are a minor contributing factor. A survey made by one utility showed that only 9.8% of meters removed from service were replaced because of burnt current coils. Mechanical damage, wrong application and various other causes appear to be just as responsible for failures as overloads. In certain areas lightning causing open potential coils may be a factor.

Miniature current transformers are meeting with favorable acceptance by several utilities in this area. Low ini-

Irion Welton

Moats Sidway

Brown Hockenbeamer

tial cost, easier handling because of lighter weight and satisfactory accuracy for metering requirements are a major factor. One utility with more than 400 in service reports no failures. Adaptability for use as a three-wire transformer and also for use on bused and nonbused installations are also cited as advantages.

Meter test tolerances vary with individual companies to some extent, depending upon local factors and conditions. Accuracy in shop tests, both on new and old meters, is usually held to plus or minus 0.5% limits on both heavy and light loads. Accuracy of shop testing equipment in some cases has a bearing on an individual company's practice. Improved meters maintain high accuracy over long periods. No doubt this will be an important factor in determining field test periods.

Utilities in this area are almost uniform in their requirements of a high school education as a minimum for metermen. Supplementary training requirements both on and off the job vary with individual companies. Every indication points to need for increased training by the utility. Hiring procedures and transfer methods have a bearing on the type of men starting at the lower levels. Supplemental courses dealing with fundamental theory and basic mathematics are a must.

Overhead T & D

E. R. Davidson, Sponsor

Application of weatherproof wire on distribution conductors was discussed by Dr. E. W. Greenfield, Kaiser Aluminum & Chemical Corp., and B. L. Peter, PG and E.

Dr. Greenfield reviewed the historical use of weatherproof conductors. Early weatherproofing was viewed with disfavor until the Utilities Research Commission developed uniform standards in 1933 for double-braid and triple-braid weatherproof. Since that time URC-type weatherproof has been produced almost universally. Polyethylene, neoprene and polyvinylchloride types of weatherproof are at the stage where uniform specifications are needed. These types of coverings appear to have advantages over the URC type although actual field experience is limited. Primary advantage is that after being installed for a period of time the polyethylene, neoprene and polyvinylchloride coverings do not lose their insulating value when they become wet.

Peter and a panel of four utility representatives each cited his company's experience with weatherproof wire on distribution conductors. The panel included P. M. McCann, Southern California Edison Co., W. B. Loper, California Electric Power Co., B. H. Sexauer, Coast Counties Gas & Electric Co., and Parker Williams, San Diego Gas & Electric Co.

In general, all of the utilities are using weatherproof wire only where required by the California Public Service Commission's general order 95 on service wires and secondary conductors in rack configuration. It is still being used by some utilities in some instances in urban areas and where tree conditions exist. Linemen should not develop a sense of security where weatherproof wire is being strung in proximity to energized conductors.

Standardization of pole line material was discussed by T. A. Bettersworth, PG and E, J. M. Culverwell, Kortick Mfg. Co., and E. H. Clark, Southern California Edison Co.

It was brought out that there is a need for greater standardization of pole line material, particularly those items that are of long standing. Most of such work is being done by groups such as EEI, NEMA, ASTM and ASA. Committee meetings are held in the east with very little Western utility representation.

Advantages of standardization were given as: reduced manufacturing costs through quantity production of a limited number of items; reduced warehousing and selling costs; improved deliveries; interchangeability of items of different manufacturers; less waste of engineering manpower in preparing specifications; and fair competition resulting from uniform specifications. The one disadvantage is the possibility of overstandardization.

Culverwell cited the status of the EEI line hardware subcommittee's projects on standardization of steel insulator pins and insulated clevises. In the first instance, the sixth and final draft recommends 11 standard pins in place of some 75 or 80 not generally listed by suppliers. The fourth draft shows nine clevises where at present about 40 are listed by suppliers.

The subject of street lighting systems was discussed by D. A. Hodges, Southern California Edison Co. Progress in street lighting systems has been stimulated principally by interest of civic groups in obtaining improved lighting. Utilities and manufacturers have done a splendid job in pointing out the advantages and economies of adequate street lighting systems.

Improvements have included brighter, more efficient light sources, fixtures that better utilize and direct available light, fixture mounting design to more advantageously locate the light source and better system controls.

Southern California Edison uses either wood or metal poles for mounting either a 6-ft bracket, where lights are on both sides of a street, or a 14- or 16-ft bracket where lights are on one side of the street only.

L. J. Flanigan, California Electric Power Co., presented a paper on low-cost feeder regulation for rural lines. His company uses pole top regulators to correct intolerable voltage conditions. Studies show that the cost of installation is recovered from increased

revenue because of improved voltage regulation. The primary voltage is regulated between 128 and 120 v.

Pole top regulators are considered to be a temporary installation as a means of improving the voltage pending a thorough survey of the circuit and arriving at a permanent solution to the problem. Such a temporary regulator is usualy on the circuit for two years or less. It is felt that such installation is economically justified.

A maintenance check is made yearly of the primary relays. At the present time there is no scheduled maintenance program for the under-oil components since there is only limited experience.

Production line methods of constructing distribution lines were discussed by Russell D. Hulse, Arizona Public Service Co., Donald E. Rodgers, Coast Counties Gas & Electric Co., and Gordon Sparrowe, PG and E. Utilization of production line methods of constructing distribution lines results in a saving of man-hours because specialists perform each phase of the job. On larger jobs it is sometimes necessary to start with camp builders who erect housing facilities for the crews that follow. The work then usually progresses in the following steps with specialists performing each phase of the work: after the line is staked, the right-of-way is cleared and trees are trimmed; holes are dug; materials are spotted; poles are framed and set by labor gangs and apprentice linemen; and wire is strung.

Mechanization is important, provided the work is organized so that the result is not just more free time for the men.

Coast Counties Gas & Electric Co., in its Santa Cruz district with seven construction crews, uses one crew of five men to set 95% of its poles. The truck used by this crew is equipped with a hydraulic pole derrick and a small air compressor to drive an air drill, jack hammer and tamper. The crew gains and drills the pole, drives pole steps, drives ground rods and sets poles. It is equipped with mobile radio and a phone line from truck driver to a hand set at rear of truck. The latter is used for guiding the truck into position when setting poles.

Discussion leaders on preformed line materials were Jordon Lummis, Southern California Edison Co., T. F. Peterson, Preformed Line Products Co., and Jack Rice, Sierra Pacific Power Co.

Peterson showed a film illustrating the manufacture as well as the application of preformed products.

Other discussion leaders covered the use of preformed products by their companies. Preformed armor rods, aluminum grip dead-ends, line guards and guy grips are finding greater and greater application on transmission, distribution and communication circuits because of ease and economies of installation. No special tools are required, although some have been used on guy grips. It appears that greater use of these and other preformed products will be made in the future.

Steam Generation

A. K. Ingraham, Sponsor

Possible improvement in steam station heat rates through use of single and double reheat and in using multistage feed water heating was stressed by D. W. B. Morgan Jr., South Philadelphia Works, Westinghouse Electric Corp. As to initial steam temperatures, he reported an average increase of 12 F per year. He said, "Five years age the average turbine size was 49 mw; today it is 125 mw. The principal effort now is to reduce the flow of steam to the condenser. In 1925 some 9 lb of steam were condensed per kwh. Today it is 4.2 lb.

"As far as the inlet end of a turbine is concerned, any size machine can be built; it is the exhaust end that controls the sizes. Turbines have grown in capacity from 7.5 mw in 1925 to 250 mw in 1951."

Westinghouse uses an unshrouded last row turbine blading, the normal tip speed of which is 1,532 ft/sec. He explained that turbine shell materials are based on the following specification:

Temperature	Alloy Steel
1,000 F	1% Cr
1,050	2.25% Cr
1,100	18.8 Austenitic

Morgan urged that every reheat turbine, either running or on order, be equipped with a reheat stop valve ahead of all reheat interceptor valves for final protection. Westinghouse turbine spindles are thermally tested at operating temperature and scrapped if found unstable. As many as five spindles have been fabricated to secure one considered acceptable.

In his opinion 250 mw at 1-in. back pressure is the minimum economical size for the cross-compound design.

Experience at the Etiwanda steam plant was covered by T. M. Hotchkiss, H. L. Anderson, and S. F. Buese, Southern California Edison Co.

Hotchkiss reported on vibration problems in boiler duct work; Buese on recirculation pump problems. The latter stated that the Bakelite refining rings on the motor ball bearings had failed and had been replaced by metal rings. Also very troublesome was wind-blown silt that settled in cooling water strainers. Pump mechanical seals are being redesigned. In the meanwhile some 25,000 lb of feed water, by-passing the last two heaters, are being injected into the glands of each pump, costing the plant heat rate about 35 Btu/kwh. This applies to the stand-by boiler feed pump also.

Anderson discussed the compressed air situation, which eliminates carbon ring instrument compressors completely. Silt caused air filters and coolers to become quite dirty. The flannel element in the filters appeared endless, wound by the bolt, and somewhat irksome to clean. It proved very effective, however. Dryers were operated for the first two months without desiccant. All are advised to check equipment before start-up. Copper tubing has chips left after cutting and assembly that must be blown out completely and carefully. At Etiwanda all auxiliary air uses, including high-pressure soot blowers, are cut out in case of low air pressure in favor of instrument air. The soot blowers, if in use, automatically are permitted to complete their cycle and retract. Instrument air is found to be free of oil, solids and moisture. Notwithstanding temperatures as low as freezing and runs as long as one-fourth mile of ¼-in. exposed copper tubing, no trouble from moisture or freezing has been experienced. The desiccant, silica gel, is rated at a two-year life. Four drying vessels of 220 lb each now operate on a six-hour cycle. One air compressor crosshead wiped. Also, the paint on some jackets burned because of silted coolers.

Operation and maintenance of the Highgrove outdoor steam plant was covered by A. A. Lingo, California Electric Power Co. This plant experiences daily temperature swings of 40-50°. Seven men only are expected to operate all four units. There is no sweeping at this plant, only washing either by hose or rain. Office and control rooms only are enclosed and air conditioned. Cooling tower blowdown is discharged to the pond in the tract park in which bass, bluegill and duck live. This arrangement is effective for insurance purposes since overflow from the pond passes over public lands and is thus proved innocuous.

C. T. Geiger, San Diego Gas & Electric Co., led a discussion on safety precautions in handling hydrogen and chlorine in steam plants. Chlorine masks have short life and are therefore provided with timers to show usable life remaining. There are three essentials in the use of chlorine: care in storing chlorine bottles, usually in 2,000-lb size; handling and protective

Blankenburg Bowen

Peterson Lummis

Kresser Hill

equipment; and training of personnel involved.

Chlorine leaks are never self-healing, always get worse. At San Diego a small water check valve became stuck, permitting overflow of the proportioner and flooding the connecting tunnel to the plant with chlorine gas. Since there was no clue as to the source, gas masks were employed and the leak traced to the point of origin.

Hydrogen, carried at ½-lb pressure in a generator shell, can produce some 80 psi on explosion. At higher initial gas pressures the figure rises materially. There is less danger during turbine operation than at start-up or just after overhaul. A 5-75% range of hydrogen is considered explosive; hence, running purities are held to 90-95%. At the Silvergate station of San Diego Gas & Electric Co., an explosion occurred in the control cabinet from a spark caused by a contactor. The unit was at a standstill at the time, but the vent was not hooked up.

Purging routine is as follows: 70% of CO_2, 90% of H and 90% of air. In testing for leaks, use 10-12 lb air pressure, soap the joints, bottle up and watch the pressure drop, which should not exceed ½ psi in 24 hours. It is then considered safe for operation. As leak detectors, odorants such as oil of wintergreen or oil of peppermint are sometimes recommended. Do not store hydrogen where overhead collector space exists that might cause accumulation.

Edward Lodge, Arizona Public Service Co., handled a discussion of training personnel.

The operating crew for the new high-pressure plant of his company, to be started about July 1954, was selected five months ahead and is now undergoing training. A questionnaire was used to determine how fast the prospect could learn. This plant, named Saguaro, is to be used as a training ground for the Ocotillo plant that should be ready about 1957-58.

These new plants fundamentally are to stabilize the long USBR transmission lines of the southwest. All operators are placed on the basic pay roll five months ahead of assignment. There is no "learning like teaching," he said.

There must be no dead-ends in operation organizational setups. Each person must be convinced there is a higher step to be achieved.

R. A. Bannister and F. A. Miller, PG and E, reported experience with boiler recirculation at the Moss Landing plant.

In the cast of boilers 7 and 8, both superheat and reheat reach 1,000 F together at 43% of boiler rating or 370,000-lb/hr steam flow. Steam temperature is first controlled by damper adjustment and second by spray attemperation. The first problem with the recirculating fans was one of alignment and support. It was found that the structural steel itself was not sufficient to insure stability. A heavy concrete pad was poured around the steel and proved satisfactory.

The second factor was warpage of the rotor and shaft that resulted in vibration of 15 mills or more. This was attributed to leakage back through the dampers when the rotor was idle. New rotors equipped with 1½-hp turning gears, connected through overrunning clutches, are expected to eliminate this difficulty inasmuch as the present "Jury Rig" turning device has been found satisfactory. Dampers also are being made as tight as possible.

There has been some burner instability at low loads with small fires when recirculation is greatest. Until recently, extinguishing of lower burners has been overcome by hand control of dampers. On No. 8 boiler steel plate deflectors, where recirculated gas enters the furnace, have been installed. During the past two or three weeks these have performed well and may be a solution to the problem, provided they are able to withstand furnace temperatures.

Pressure-fired furnaces was the subject of F. A. Iwerks and F. R. Hanrahan, C. C. Moore & Co. A pressurized furnace is generally built against a wall with little refractory. Heat of compression increases air temperature about 30 F. Reliability is increased by elimination of the induced-draft fans and the furnace is safer from explosion since no upset pressure condition is possible. The forced-draft fan handles clean cold air, hence has better efficiency. Air pressure tests must not lose over one inch of water per hour to be considered satisfactory. There are problems such as caring for necessary expansions, providing tightness of every detail such as burners, etc., and in making possible ash removal in coal-fired jobs. All kinds of solid fuels have been considered and some pressurized furnaces have included emergency induced-draft fans. No *oil- or gas*-fired B&W furnace has been so equipped with an emergency fan. At Tucson the pressure-fired furnace operated nine months before the first outage. With users who have had experience, this design appears to be preferred. B&W has supplied 100 large boilers equipped with pressure furnaces to an aggregate total of over 72,000,000 lb of steam per hour capacity.

In a joint meeting with the engineering group, C. M. Wright, General Electric Co., Schenectady, spoke on application of gas turbine to electric power generation. He said that G-E now has placed four basic gas turbine cycles in successful operation. Seventeen of the units are being used for power generation. After four years a gas turbine-generator in Oklahoma has had its first scheduled inspection and overhaul. It was placed back in operation with practically all of its major parts.

Although natural gas has been the most successful fuel, he revealed that preliminary results on operation with new Bunker C specifications indicate that the problem of such fuel is very close to being solved.

New units, smaller and larger than the present 5,000- to 7,000-hp range, are planned. Maximum economical size of gas turbines now appears to be between 10,000 and 20,000 kw, said Wright.

In combination with a superheated boiler in a gas turbine-steam turbine plant, the boiler furnace would replace the combustion chambers of the gas turbine. Heat rate for such a plant would be 5% better than a straight steam turbine plant of comparable size and operating conditions. He predicts that the gas turbine may play an important part in future power generation.

In the same joint session C. D. Wilson, Allis-Chalmers Mfg. Co., Milwaukee, presented the case for cross-compound steam turbines. Rapid advances made in steam turbine development have resulted in two general types for large capacity installations. One is the 3,600-rpm tandem machine, the other is the cross-compound arrangement with the high temperature elements operating at 3,600 rpm and the low temperature elements operating at 1,800 rpm. Each has its own particular advantages and a careful evaluation of these will usually indicate which is better for a specific application.

A. L. Sherman, chief engineer, Pacific Pumps Inc., Huntington Park, Calif., traced the origin and growth of high speed turbine driven feed pumps of the type known as Turbopumps. These operate at speeds of 7,000 rpm or more. He said that in an existing plant a Turbopump can be added as a net kw booster to give 3-4% more plant output. In a new plant a Turbopump and an electric pump can be installed as original equipment cheaper than two electric pumps. This will add 3-4% to capability and either can be run as preferred. In Sherman's opinion, with optimum plant arrangement, station heat rates with Turbopumps will be better than with electric driven feed pumps.

Another contribution to the joint meeting was a discussion on the application of plastic pipe in steam plants by Robert E. Deshon, Republic Supply Co. of California. Principal advantages are freedom from chemical attack, electrolysis, soil conditions, cell and galvanic action. Plastic pipes have high flow factor or low friction loss and reduced tendency for inside walls to scale or foul up. Disadvantages are low temperature range (180° maximum), low working pressure (maximum 200 psi), and reduced physical strength. It has actually been established, he said, that many savings through lower material costs, longer life and reduced maintenance charges are possible through the use of plastic pipe in the *right place*.

Substation Group

W. L. Moats, Sponsor

Joint meetings were held with several other groups — communication, hydro, system operation and engineering design. In the meeting with the hydro group E. W. Beck, Westinghouse Electric Corp., led discussion on surge protection for substations. He discussed the fundamentals of surge protection for various types of substations classified as large and small, shielded and unshielded, also the probability of lightning strokes and explained how the protective measures adopted in practice are generally compromises influenced by economics and probability. It must be remembered, he said, that when probabilities are relied upon some calculated risk is involved.

Field tests made recently with an artificial lightning generator in a large, shielded substation on the Tidd project in Ohio were described. These tests have provided valuable data on the protection of large stations. Other studies and tests have been made in the laboratory using transient analyzers. In one such study of a particularly large 330-kv substation with five incoming lines and 14 three-phase transformers, it was shown that adequate protection could be obtained by only seven sets of lightning arresters.

In the lively discussion that followed Beck's presentation, C. L. Sidway of Southern California Edison Co. pointed out the dangers of eliminating lightning protection based on probabilities because of the law of "random perversity."

H. J. Erling, PG and E, led a most interesting panel discussion of load break disconnect switches that started with a review of development and background. He described the use of these devices to switch voltage regulators, capacitor banks and spare transformers. He gave the benefits of these load interrupters as: long life with low maintenance; interruptions without flame or fire; interrupters can be mounted in any position, indoor or outdoor; the number of oil circuit breakers required is reduced with consequent dollar savings.

W. J. Lindstrom described installations his company, the California Electric Power Co., had made of load break disconnects to switch capacitor banks, isolate parallel banks of transformers, and interrupt line charging current on a 20-mile 90-kv line.

Russell D. Hulse commented that Arizona Public Service Co. had made comparatively little use of load break disconnects, although it does have one in operation at 69 kv and plans additional use on 69-kv lines to interrupt charging current.

Harvey N. Skow, Westinghouse, outlined research during the past 10 years that has led to the development of the load interrupter now on the market that uses sulphur hexafluoride in a porcelain housing to provide a NEMA class A load interrupter switch. Sulphur hexafluoride is an inert gas with high dielectric properties. This switch is now available in rating from 15 to 115 kv.

J. Castle, S & C Electric Co., Chicago, described switches now available up to 34.5 kv and research being carried on toward the development of higher voltage ratings. The present switches are available for both indoor and outdoor service, can be mounted in any position and have confined arcs.

William Poynter of Pacific Electric Mfg. Co. commented that Pacific Electric's first load interrupter switch was built in 1913 and described a 115-kv, 600-amp switch recently built for the Bonneville Power Administration. On test this switch had interrupted up to 2,800 amp. Poynter raised the question of the amount of interrupting capacity desired by utilities in devices of this type and suggested that the name fault interrupter be used instead of load interrupter.

V. E. Kaste stated that the General Electric Co. is carrying on extensive research to develop an economical switch of desired ratings.

In the informal discussion that followed the comments of the above panel, G. L. Hill, PG and E, stated that an AIEE committee is doing considerable work toward standardizing ratings and characteristics desired for load break disconnects.

Discussion on substation batteries and chargers was led by Arthur Klopfenstein, Southern California Edison Co. He described the various types of batteries and chargers used by his company. Considerable care and study are given to chargers to obtain long battery life. Selenium rectifier chargers are being used primarily now with several different types of regulating circuits. One of the principal problems encountered has been short life of capacitor components in areas of high temperature. Increased life of these components

can be obtained by reducing the applied voltages to as low as 53% of the components rated voltage.

Aging of selenium rectifier stacks can be a serious problem and is at its worst in a combination of heavy continued loading, poor air circulation and high humidity. The most useful test to determine the aging of a rectifier is a short circuit test to measure forward resistance. Continued improvements in selenium rectifiers and additional application information make it possible to have selenium rectifiers last as long as the batteries they charge.

Discussion brought out the fact that it is possible to damage power line carrier or supervisory control equipment during the process of giving a battery an equalization charge. The proper procedure to prevent this was described.

Speaking on preventive maintenance in substations H. R. Daniels, PG and E, said preventive maintenance is insurance for the traditional good service of the electric industry. With today's increasing costs it is necessary to develop new and better methods and still maintain service. With that theme Daniels described the maintenance procedures of PG and E and the things it is doing to improve policies and practice. He also described bulletins issued by the operating department that cover recommended maintenance practices for specific jobs. By disseminating information in that way it is hoped to do an improved and more economical preventive maintenance job.

Parker Williams, San Diego Gas & Electric Co., outlined general maintenance practices of his company that include crews specializing in maintaining particular lines of equipment.

T. A. Phillips, Arizona Public Service Co., described the new box-type steel substation structures that his company has developed. These structures use tapered steel columns with sides of steel plate instead of lattice construction. Approximately four times as many pounds of steel are required but considerable savings in the material for buses and bus supports, as well as in erection time, make the two types of stations comparable in cost. Advantages of the box-type structure are greatly improved appearance and reduced maintenance.

System Operation

I. W. Collins, Sponsor

A joint session held with the substation and communications groups covered the topic of supervisory or automatic control. Discussion was led by J. V. Kresser of Westinghouse and A. R. Worthington of PG and E. It was brought out that it is not always easy to determine which of the two methods should be used and that each case must be evaluated on engineering and economic features. Automatic is in general somewhat less expensive and simpler but in more complex stations the need for means to change operating setups will frequently require the use of supervisory control, either as a complete supervisory system or in conjunction with some automatic features.

With supervisory control, operation of a station is under full control at all times, while with automatic only predetermined functions can be handled by the automatic equipment. If conditions other than those for which the equipment has been set up exist, manual attendance will be required, or some degree of supervisory, if remote operation is desired.

The topic was one that aroused a great deal of interest with considerable discussion from the audience. Among the points brought out were the importance of reliability and quality of the communications channels involved, the need for a higher grade of maintenance personnel, the fact that experience is proving the practicability of automation of more and more important plants with operating experience that has been favorable in applications of both automatic and supervisory.

Harry McKnight, PG and E, presented an outline of the method being used by his company for selecting the right man for the job. It was pointed out that *attitudes* of potential employees and of promotable employees are as important as *aptitudes*. Where promotions are made within the organization, it is particularly important to maintain an inventory of talents. Such an inventory must be kept current. When information is available, along with an estimate of the number of promotion opportunities in a year's time, it is possible to approach the problem of filling job vacancies in an orderly fashion.

An inventory of the type mentioned can be used also to diagnose the health of an organization. It can insure that promotable people be given opportunities for development in order to meet requirements due to attrition from retirements or other causes. Only when maximum talents of an employee are being used does the employer get maximum return from the employee and the employee gets maximum satisfaction from his job.

Methods of training substation and power house operators were discussed by C. R. Canady and R. F. Tharp of the Southern California Edison Co. and E. A. Crellin, PG and E. It was brought out that considerable help could be gained by going over specific operating problems. The operators' training school of the Edison company was described.

G. E. Bishop, Coast Counties Gas & Electric Co., discussed the development of the safety manual that has been accepted by all operating companies in the PCEA.

C. W. Eddy, California Electric Power Co., and E. C. Hunt, PG and E, closed the session with a short discussion on safety.

Fred Strauss of the California Division of Water Resources discussed the forecasting of runoff from snow measurements. He pointed out that there was considerable correlation from the experience of previous years' runoff in making forecasts. From empirical data it was shown that the accuracy of forecasting has increased and that as the snow surveys are completed it is possible to make certain predictions of minimum runoff. These are then modified as later surveys are made. The actual runoff figures compared to predictions show that the margin of error is within only a few per cent.

Weather forecasting and its relation to power production was discussed by C. P. Smith, chief gas dispatcher for PG and E. The need for more accurate work in the field of meteorology by power utilities was stressed. It was pointed out that services from the U. S. Weather Bureau are not and cannot be adequate for all the needs of the industry. There is a need for more competent meteorological engineers within industry who are conversant with both the scientific aspects of weather and the related applications to industrial problems.

Meteorology can serve in providing short range operation weather forecasts, long range planning forecasts, weather modifications, snow survey and runoff forecasts, atmospheric pollution problems and line loading design.

In other fields of endeavor industry has taken the initiative by going beyond the services provided by governmental agencies. In meteorology the tendency has been to depend almost entirely on the U. S. Weather Bureau. Considering the importance of weather information to the power industry, there is much to be gained by putting the techniques and skills of the science of meteorology to work for us, said Smith.

In a joint session with the overhead transmission and distribution group, Richard D. Eccles of Helicopter Services of California and H. E. Pangborn of the California Electric Power Co. discussed the use of helicopters for patrolling of lines. Eccles pointed out

the limits and capabilities of helicopters and showed pictures of actual patrol flights. Pangborn said that, while the experience of his company had been successful in the use of helicopters, increases in hourly cost and the application of transportation tax had made the cost prohibitive. Consequently, the California Electric Power Co. had gone back to the physical patrolling of lines.

Operating economics as effected by load assignments and transmission losses were discussed by H. R. Perry, PG and E, and Whitman Ridgway, General Electric Co. They outlined the development of scheduling of generation for over-all system economy, considering first incremental generation costs, then incremental transmission losses. Methods of calculating transmission losses as penalty factors to be applied to the scheduling of generation of plants so that transmission losses can be included in the over-all economy picture were described.

Considering these factors, there are many cases where high cost generation located near load centers may be more economical than low cost generation some distance from the load centers. The use of transmission losses in scheduling generation has not been applied to any great degree in the past because of lack of workable methods for computing line losses. Recently, by the application of the tensor analysis and digital computers, along with a recently developed penalty factor computor, it has become possible to apply these factors practically in the scheduling of generation. In the near future the method may be applied automatically with load-frequency control equipment to control generation for over-all economic loading of power systems.

Transportation Group

W. H. Brown, Sponsor

The program of PG and E for reducing automotive accidents through testing and training of drivers was discussed by E. F. Hockenbeamer. Driver training and testing were covered briefly since conventional methods are used. Qualification testing was given more detail. Briefly, qualification testing consists of giving each driver the equivalent of the State Department of Motor Vehicle's grade "A" chauffeurs' license test, plus qualification tests on truck-mounted auxiliary equipment such as winches, earth boring machines and construction equipment, such as tractors, trenchers. The issue of a company permit showing driver's qualifications was shown.

Objective of the program is to have operation of vehicles or equipment, or both, by company employees limited to that shown on this company permit.

Personnel used for testing procedure and certain unusual elements were also briefly covered. Also discussed was the California Vehicle Code, Sec. 685 and 686, covering trucks hauling employees. Action taken by PG and E to comply with these sections was presented.

Increasing labor costs over the past years have caused utilities to be on the alert for labor-saving devices. G. P. Larson, PG and E, served as discussion leader on hydraulically operated pole derricks, jacks and other equipment. Discussion was of the round-table type, centering around hydraulic pole raising booms, reel dollies, lifts and towers, pole pulling jacks and lo-bed trailers.

It appeared that the hydraulic pole raising boom is meeting with success by all who are using it. Advantages are saving of time, safe operation and use in service yards for handling transformers and other equipment where portable cranes are not available. Consensus was that savings of $5 to $25 per crew-day can be made with the hydraulic boom over the old style A-frame.

It was the general opinion that the hydraulic reel dolly makes the handling of reels a safer and quicker operation. Hydraulic equipment is widely used for washing insulators and street lighting maintenance work. Some users present believed that such equipment used on street light maintenance will do twice the work of a ladder truck.

The hydraulic pole pulling jack has met with excellent response by those using it. It is particularly effective in moving or trenching poles. Savings of at least $5 per pole for pulling were reported and in one case as high as $750 on one job.

E. W. Ferguson, PG and E, led a discussion on the practicability of performing maintenance work in outside shops vs company shops. Maintenance of special types of equipment such as four- and six-wheel drive vehicles, winches, compressors, earth boring machines, trenchers, etc., and vehicles of popular makes and models was considered.

It was agreed by those present that company-owned shops were generally necessary for adequate maintenance of trucks, special types of equipment and for preventive maintenance of all equipment; that the quality of workmanship is usually superior in company shops; that adequate supervision by qualified company personnel is necessary if satisfactory workmanship is to be expected from outside shops; that it is often desirable to use outside shops for specialized jobs such as wheel and frame alignment, painting, body work, upholstery, glass, unit rebuilding, etc., depending upon facilities, service and class of workmanship available, and the work load.

L. J. Abell, PG and E, led a discussion on proper selection of motor vehicle equipment to fit job requirements. He reported on a survey being conducted by his department to determine if they were purchasing the proper vehicles, properly equipped to perform the jobs required of them. From this survey, a catalog is to be developed showing specifications of vehicles to be used by the company.

Other topics covered were sizes of engines, two-speed axles, auxiliary transmissions, all wheel drive vehicles, crew compartment trucks and various accessories, such as no-spin differentials, power proportioners, etc.

General discussion covered new sections of the California Motor Vehicle Code, Sec. 685 and 686, already referred to above.

Replacement policies for passenger vehicles, pickups and heavy equipment were discussed with considerable variance in reports. It appeared that most utilities represented have a yardstick but no fixed policy on replacements. Policy for replacement of a passenger car ranged from 2½ to as high as seven years.

Leasing of equipment is being done by some utilities to smooth out the peak demands for extra vehicles.

All utilities represented except one reported the use of some employee-owned cars used on company business with a range of mileage rates paid.

Use of recapped tires was discussed at some length with the conclusion they are not to be recommended for passenger cars on highway use and in no case on the front wheels of a vehicle, except the heavier, slow-moving equipment.

Underground T & D

R. C. Blankenburg, Sponsor

The underground group heard from H. S. Christensen, Underground Electric Co., how planning can save costs in underground structure contracts. He said utilities should standardize structures wherever possible, use simple, easy-reading plans and specifications, do more to locate obstructions at their expense, control any inspectors who are inclined to avoid a realistic approach to interpretation of specs and plans, and allow the contractor the fullest freedom possible in doing work. It would be desirable, he said, if space could be assigned to various utilities so that each user of substructures has a predetermined location reserved for his structures.

James B. Bowen, San Diego Gas &

Electric Co., told of the plan followed in San Diego for assigning locations for underground structures. All work is coordinated by a substructure committee and the city does not require permits to be taken out for plans that have been approved by this committee. C. B. Nelson, PG and E, said that this was done in San Francisco some years ago but had been dropped. He would like to see the system re-established.

Use of metal forms for manhole construction was discussed by Bowen. A movie was shown giving details of these forms and their use. One set of forms used by his company is about 10 years old. They cost about $700 originally and have been used to build nearly 100 transformer manholes. For a typical transformer vault, Bowen estimates the following man-hours: 15 to place the forms on the previously poured floor, about six for placing wall steel, 15 to pour walls and roof, including placing of roof steel, and stripping about six man-hours.

A movie showing details and installation of precast manholes was presented by Paul E. Rist, Arizona Public Service Co. He said typical cost for a manhole about 10x10x7½ ft deep, precast and set in place, is $700. Total cost of completed installations has averaged about $1,660. One day is generally sufficient to open the excavation, set the precast structure, backfill and place subpavement. Final paving is usually placed on the second day.

Slides were used by George Stangenberger, PG and E, to illustrate some of the problems encountered when manhole and vaults must be rebuilt in congested street locations. Because of the complications encountered, his company has developed unit reinforcing schedules, uses only ⅜-in. reinforcing steel and two standard sizes of channel iron. Steel is cut and bent at the job site. This plan permits adjustment of dimensions to fit conditions after excavation is complete.

T. L. Van Law, Southern California Edison Co., described the system developed by his company to coordinate plans and installations of structures built by the customer on his premises for use by the utility. About 800 jobs have been processed during the past four years. The key to this system is a coordinator in the utility's commercial department. Inquiries and requests coming from architects and engineers are channeled through this center. They are referred to all various interested persons in the utility. These individuals in turn make their recommendations, which are routed through the proper channels to the coordinator and thence to the architects and engineers. Follow-up inquiries are similarly routed until plans acceptable to all parties have been developed. A control board and colored pins are used to show at a glance the status of every pending inquiry. Special tracing forms have been developed to outline all structural requirements. The system has eliminated confusion and expedited getting these requests processed.

Installation of an a-c network system in the Oakland downtown district was described by David G. Kilgour, PG and E. Plans included a gradual conversion from 4 kv to 12 kv. General plan was to use sidewalk vaults for the important building loads. The reasons were that in sidewalk areas there are fewer obstructions, large grated sidewalk doors with larger ventilating area than the 36-in. circular street gratings could be used, openings are of sufficient size to permit easy installation of large network units and, moveover, vaults are closer to building load centers. Transformer banks are in general networked on the secondary with four 500-MCM cables. To date nine 300-kva and fifty-one 500-kva network transformers have been installed. In 23 years the network has proved dependable and trouble-free.

A description of the San Francisco downtown network of PG and E was given by Fred R. Milam. Total cost of the system is over $5,000,000. Twenty-one 12-kv feeders containing 46 miles of 12-kv cable with capacity of 150,000 kva serve 325 transformer units feeding 161 miles of secondary cable. Demand on the system is 100,000 kva.

Leonard Curran and J. Lawson, PG and E, covered cable testing and fault locating devices. Curran discussed use of the James G. Biddle impulse cable fault locator. This is a tracer current device using a capacitor discharge for fault locating. It weighs 300 lb, has low energy input and large output current. He reported a total of 356 tests made. Of these 35 were made following failures and 31 faults were located. It was not necessary to trace the other four. Tests made following repairs totaled 58. There were 216 tests purposely made, and 16 for incipient faults. There were no cases of inability to locate a fault.

Jack Lawson covered cable fault locating practice in the East Bay division of PG and E. Use is made of an impulse generator, sound level meter, special pickup loop used in conjunction with an impulse generator and Biddle detector. Buried or trench lay cable presents an unusual fault locating problem, said Lawson.

Terminals and splices for rubberlike insulated cables were discussed by Edward Danielson, the Okonite Co. He gave the objectives in splicing as: to duplicate as closely as possible the factory applied insulation; to protect the joint from moisture and chemicals in ducts and manholes; and to make a joint that will last as long as the cable itself. The presentation covered materials available, splicing procedure, preparation of cable, terminating procedure, special splices and education of cable splicers.

Adequate and coordinated transformer protection in underground systems presents a problem, N. K. Yarnell, H. J. Randolph Co., told the meeting. He described cooperative tests made by the Southern California Edison Co. and the S & C Electric Co. to determine the feasibility of placing high-voltage power fuses within a tightly sealed cabinet and have such fuses perform their rated duties.

Analysis of oscillograms showed that: for any given bore size clearing time decreases with decrease in back pressure; within the limits of the holders to withstand the internal pressures, clearing time decreases with bore size. Yarnell concluded by saying that advancements in the field of submergible high-voltage transformer protection will probably be slow from here on, as with each step field testing is a must.

Electric Clubs

James G. Kirwan of Westinghouse Electric Corp. was installed as president of the Electric Club of Oregon, succeeding William H. Hayden of Portland General Electric Co. Other new officers are Harry F. Stengel, Bonneville Power Administration, first vice-president; E. P. Siegert, Central Supply Co., second vice-president; George B. Bocarde, Pacific Power & Light Co., treasurer; Leonard Kallen, executive secretary; L. Jerry Collins, Portland GE, sergeant-at-arms; Stanley G. Martz, G-E, and Earl F. Woodley, Stubbs Electric Co., also serve on the executive committee.

The Electric Club of San Francisco inaugurated Harry A. Lee, division manager, PG and E, as its new president, succeeding Frank E. Bodine, Westinghouse Electric Corp. Charles L. Huyck was re-elected secretary-treasurer and directors added were Donald I. Cone, Pacific Telephone Co., Guy de Leuze, Panama Lamp & Commercial Co., and Charles H. Sedam, engineer, PG and E. A Chinese theme was used for a burlesque inauguration ceremony.

San Diego Electric Club installed William J. Myers as its president, Ernest B. Kipp first vice-president and James Lyon second vice-president. Carleton J. Bunce was re-elected secretary-treasurer.

Quick Catch Up

Flowers are not the only things that bloom in the spring. Associations burst into bloom with more and more meetings and activities. As brief as it can be made, here is what is going on:

RMEL

Annual spring conference of Rocky Mountain Electrical League will be at the Shirley-Savoy Hotel, Denver, May 2-4. Two general sessions, the opening and closing periods, and concurrent committee sessions in between are on the program. The accounting committee chairman is E. E. Matthews, wiring J. L. Vanneman, engineering Ken Eaton, sales and promotion W. L. Duncan, new information Warren Terry, and Robert T. Person, Public Service of Colorado, is conference chairman.

Ralph Hubbard, manager, RMEL, announced the move of its headquarters from the Gas & Electric Building to the ground floor of the Double A Building at 1300 Glenarm Place across from Denver Athletic Club.

IAEI

Everett F. Cogan, technical assistant secretary, International Association of Electrical Inspectors, this year will make the series of meetings of chapters arranged in a tour of the West during March, April and May. First will be with the Southern California Chapter at San Diego March 31; a joint meeting of Northern and Central California and Sacramento Valley Chapters April 9, San Jose; Oregon Chapter April 6, Portland; Puget Sound Chapter April 9, Olympia; Eastern Washington April 12, Spokane; Idaho April 15, Boise; Montana April 19-20, Bozeman; Nevada April 24, Winnemucca; Utah April 26, Salt Lake City; Rocky Mountain April 30, Denver; New Mexico May 3 Albuquerque; and Arizona May 8 at Phoenix.

Cogan will bring the latest information regarding IAEI activities from headquarters, as well as reports on work being done by the committees revising the National Electrical Code. It will be his first trip to the West. Most of the chapters are also holding their annual business meeting at the time, with election of officers and a special program.

The Northern California Chapter meeting will be featured by a visit to the new Underwriters' Laboratories building, under construction at Santa Clara. At its last meeting, this chapter elected Chester Hefner, San Mateo County inspector, as its chairman; Delbert Hansen, chief inspector, vice-chairman; and Ken Bliss secretary-treasurer.

EIA of B. C.

Fifth annual conference of the Electrical Inspectors' Assn. of British Columbia was held Feb. 18-20 at Hotel Georgia, Vancouver. Among subjects covered were the new edition of the Canadian National Code by L. Robson and provincial amendments by L. Ryan. P. Rive discussed wiring procedure in 1954 and a panel discussion was held on each of the following: outdoor transformer setup, vault construction and transformer wiring hookups.

IES

The three regional conferences of the Illuminating Engineering Society in the West begin April 15-16 for the Intermountain region at the Brown Palace Hotel, Denver. Glenn B. Gaer is program chairman. Program details have not been announced.

South Pacific Coast conference at San Francisco Museum of Art, with some sessions at Western Merchandise Mart, is to be April 19-20. Its program has already been published. John S. Walsh is conference chairman.

Pacific Northwest regional conference will be held at the Benjamin Franklin Hotel, Seattle, April 23-24. No announcement of program had been received at press time. A number of national speakers will appear on each of the programs, in addition to A. H. Manwaring of Philadelphia, IES president. Among them are Marshall Waterman, assistant manager, commercial engineering, Westinghouse Lamp Division, Bloomfield; Alston Rodgers, chief illuminating engineer, General Electric Lighting Institute, Cleveland; Samuel G. Hibben, past president, Illuminating Engineering Society, now retired; Walter Granville, color consultant, Container Corp. of America, Chicago; Don P. Caverly, manager, national accounts, Sylvania Electric products, New York; E. W. Commery, executive engineer, General Electric Lighting Institute, Cleveland; Jacob H. Blitzer, vice-president, Lightolier Inc., New York; David M. Baldwin, director, traffic division, National Safety Council, Chicago; R. E. Madigan, Line Material Co., Milwaukee. Willard Allphin of Sylvania is also expected at some of the meetings.

NCEB

George S. DeBonis, vice-president and merchandise manager of City of Paris, San Francisco, succeeded W. J. Lee, Sherman Clay & Co., as president of the Northern California Electrical Bureau. Lee served for three years. Other officers elected were: Charles W. Goodwin Jr., vice-president, General Electric Supply Co.; O. R. Doerr, secretary, vice-president, PG and E; Frank K. Runyan, treasurer, general manager, Western Merchandise Mart; and John S. C. Ross, chairman of the executive committee, PG an E. The board of directors includes the executives of 45 business firms or associations in northern California representing all branches of the electrical industry. The bureau's six sections plan stepped up activity on

Theatrical lighting featured the Northern California Section IES meeting at which Robert Graham, left, spoke, Frank Falge, G-E Lamp Division, IES chairman, presided, veteran Charlie Holzmueller attended and his successor, Arch Munson, arranged show

appliances, radio and TV, wiring, lighting, electrical housewares and sales education, all supported by PG and E advertising and assisted by its commercial personnel.

San Francisco Unit in turn recently elected Clarence E. Dulfer, retail dealer, as its president, M. V. Musy, Westinghouse Electric Supply Corp., vice-president, and Carl P. McCarthy, PG and E, secretary. Sixteen retail and contractor directors, seven wholesalers and two utility directors make up the board.

In San Jose Al Smith, appliance department manager of L. Lion & Sons furniture store, succeeded Leo Allampress of Dohrmann's as president of the Santa Clara County Gas & Electric Appliance Dealers Assn., a unit of NCEB. Vice-president is Harold Beutel, Beutel Refrigeration Sales & Service, and Lew Russell, PG and E, is secretary. Earl Rider represents the group on the NCEB board.

NISA

Northern California Chapter of National Industrial Service Assn. honored four 50-year veterans of the electric motor shop industry at a special dinner, presided over by Keith Noble, Pacific Electric Motor Co., Oakland, chairman of the chapter, Feb. 25. William Hogue, Larsen-Hogue Co., Los Angeles, national president of the NISA, made a trip to San Francisco to honor the men and address the large meeting.

Of the four honored, two were present but two, because of ill-health, were represented by their sons, now running their father's business.

Also attending was previously honored R. H. Conrad, founder of Conrad Electric of Oakland, who has been 60 years in the business.

Fred Buzzell, founder of Buzzell Electric Works, San Francisco; Frank Boyd, president, Pacific Electric Motor Co., Oakland; Martin Flatland, founder of Globe Electric Works, San Francisco; and John J. Van Alstyne, of Sacramento were honorees. Lloyd Flatland represeented his father and Jack Van Alstyne Jr. his.

Another old-timer to whom tribute was paid was Arthur E. Rowe, publisher of the A. E. Rowe pricing services and manager of the San Francisco Bay area bid depository.

EMEA

Final details for the big industrial industry show April 1-3, staged by the Electric Maintenance Engineers Assn. of southern California, were announced by President L. J. Rejda and John J. Singleton, first vice-president, show chairmen. I. W. Borda, vice-president, Okonite Co., will be the speaker at the Statler Hotel luncheon, which will open the event, followed by a preview of exhibits.

Last meeting of the group, March 17, heard Theodore W. Zonker, field engineer, B. Wise & Associates, manufacturers' representative handling Multi-Amp Corp., talk on "Do Protective Devices Really Protect?" Jack C. Cochran, executive committee member, who left for Dallas, Tex., to a new position with General American Oil Co., was succeeded on the executive committee by Charles Hays, The Electrical Estimators. Carl L. Ladenberger, Southern California Edison Co., was named secretary-treasurer, and Robert Marcum, Hughes Aircraft, has accepted a pro-tem appointment in the absence of Mike Boyak.

Top Industry Speakers for NWEL&PA

Top industry speakers from the electric utilities and electric manufacturers will appear on the general sessions of the Business Development Section meeting of the Northwest Electric Light & Power Assn. in Boise, May 10-12. The program will be rounded out by intensive working conferences of three bureaus and two committees.

At the opening session Monday morning, May 10, after greetings by local dignitaries, A. W. Trimble, president of Mountain States Power Co. and president of the association, will respond. T. E. Roach, president of Idaho Power Co., will bring the delegates up to date on the progress of the company's application to construct three plants in the Hells Canyon area of the Snake River, and J. E. Corette, president of Montana Power Co., will discuss the five-company partnership plan for developing hydro power cooperatively on tributaries of the Columbia River and tying in such plants with the federal power system, in accord with the new federal power policy of the Department of Interior.

Kinsey M. Robinson, president of Washington Water Power Co., has agreed to take a spot later on the program to develop executive thinking with regard to the importance of selling power service and promoting new business.

Others on the general sessions, Tuesday and Wednesday mornings, will be representatives of appliance manufacturers on the subject of market potential and related matters. The names of such speakers have not been definitely committed as yet.

Also planned for the general sessions is a panel of sales managers to bring out through questions, answers and discussions from the floor, the answers to several pertinent questions pertaining to the organization of utility sales departments and their relation to appliance selling units in the territory. Moderator of this panel will be K. I. Jack, sales manager of Washington Water Power Co. D. J. McGonigle, sales manager of Montana Power Co. and chairman of the section, will share presiding duties with his vice-chairman, C. W. Brissenden, sales manager of Portland General Electric Co.

The bureaus and committees that will hold separate sessions of their own on the afternoons of Monday and Tuesday, May 10 and 11, are: Electric Home Bureau, Leonard Regan, Montana Power Co., chairman; Commercial and Industrial Bureau, Blair Plowman, Washington Water Power Co., chairman; Rural and Farm Bureau, C. A. Root, Pacific Power & Light Co., chairman; advertising and publicity committee, R. K. Foley, Pacific Power & Light Co., chairman; and rate research committee, Duane Olney, Washington Water Power Co., chairman. These sessions will take up in greater detail many knotty problems of selling and operating in their respective fields.

Some of the subjects to be covered in the Electric Home Bureau are: how to evaluate results in utility residential sales departments, how home service departments can build load and new business, helping dealer salesmen and general employee participation in sales programs. The Commercial and Industrial Bureau will examine, among other things, the replacement of commercial cooking appliances to modernize these installations, load building through lighting maintenance programs, the promotion of 480-v distribution for commercial light and power service, and whether commercial sales are best promoted by specialty men or all-round salesmen.

Local arrangements for the meeting are in the hands of A. S. Gilbert, sales manager, Idaho Power Co., as general chairman. Henry Falkner, Westinghouse Electric Supply Co., Boise, will head the manufacturers and wholesalers entertainment committee. Trips to nearby points of interest, a banquet and cocktail hour, and a special affair for the ladies are program features.

PANORAMA OF THE PCEA

Convention Plans

PCEA's annual convention this year, scheduled for May 19, 20, and 21 at the Hotel del Coronado in San Diego, is shaping up as a highlight in association history. With the theme, "Side by Side for Electrical Progress," all phases of the electric industry will be represented and the program will be highly interesting and informative for everyone.

Coronado is famed as a superb playground. In addition to the wide variety of entertainment available there, side trips to Mexico will provide unique and colorful special events and fun for all. Those who have visited Coronado before will be looking forward to returning and an even bigger treat is in store for those who have never been there.

The program will be packed with activity. Stimulating meetings are planned with nationally known men who are outstanding in their fields, including Ralph A. Tudor, Under-Secretary of the Department of Interior. His subject has not yet been set but his talk will be especially timely because of the new government encouragement of private power development, the proposed upper Colorado River project, and other information he may give us.

Walter H. Sammis, president of the Edison Electric Institute and president of the Ohio Edison Co., and Kinsey M. Robinson, president of the Washington Water Power Co., are scheduled to speak. Virgil Pinkley, widely known editor and publisher of the Los Angeles *Mirror*, will give one of his famous inspirational luncheon talks.

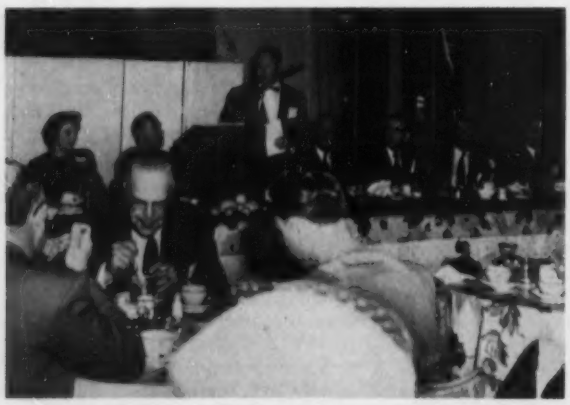
Of special interest to everyone will be a symposium on atomic energy, "Today's Outlook for Atomic Power," conducted by C. C. Whelchel, chief of the division of steam engineering, Pacific Gas and Electric Co., and James M. Landis, vice-president of Bechtel Corp. Charles P. Culvert, vice-president of Sues, Young & Brown Inc., will give a stimulating presentation "Merchandise or Drop Dead," and Herbert A. Leggett, vice-president of the Valley National Bank in Phoenix, will cover the economic field.

Professor H. B. Walker, University of California at Davis, will speak on "Electricity in Agriculture," and as this was written arrangements were being made for other top-drawer speakers.

Additional information about the convention will be sent to all members, together with reservation blanks. All hotel reservations must be made through the hotel reservation chairman, so be sure to send him your reservation as soon as possible after receiving the blank.

Busy Days for Section

Much greater attendance than at last year's series of regional meetings of the Business Development Section of PCEA is being recorded this year as the series of ten winds up with one in San Diego April 6 and the final one at Phoenix, April 8. A more complete report on the content of the meetings will be given next issue, with pictures of participants and summaries of the individual presentations. But it is well to report the success of Chairman Walter Chapman's section program in terms of attendance. At the first meeting in Sonoma there were 248 at luncheon. San Jose had 220, Marysville about the same, Visalia nearly 300, Long Beach 242, San Bernardino 250, Santa Barbara 200 and Reno about 150. Exact totals will be given later.



Typical of all of the luncheons or dinners that were part of the PCEA Business Development Section's ten regional meetings were these, the first one at Sonoma, left, and the one at San Bernardino, right. Walter Chapman, SDG&E, section chairman, center, left, as he opened the first. At the head table: Marjorie Helm, Calif. Electric Power, home economics chairman; O. R. Doerr, PG and E, luncheon speaker; Chapman; H. V. Patton, PG and E, Sonoma meeting chairman; Jack Corlett, G-E, section vice-chairman; Willis Winter, Westinghouse; James Tuttle, Motorola, TV speaker. At San Bernardino's Arrowhead Springs Hotel: Victor Hartley, PCEA managing director; John H. Mead, So. Calif. Edison vice-president; D. B. Wheelock, Calif. Elec. Power vice-president; Mrs. and Mr. W. Break, county supervisor; Robert Neuman, Calif. Elec. Power division manager; William K. Dunkle, So. Calif. Edison division manager (standing); Mayor George Blair, former Edison man; Chapman; Carl C. Ernst, vice-president and general manager, California Electric Power; R. J. Doyle, former division manager of Southern California Edison Co. at San Bernardino and now manager of the eastern division of that company

CFI DAY-LINE®

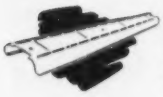
(COMFORT FOR INDUSTRY)

Easy to handle

Contractor features include knock-outs and fittings for pipe, chain, stem and messenger cable suspension; no-sag, no-bend one-piece reflector; simplified wiring.

Easy to install

LOOK AT THESE EXTRA VALUE USER FEATURES

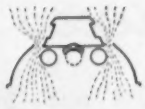


ALL-WHITE PORCELAIN REFLECTORS. Outside as well as inside, entire one-piece reflector is finished in snow white porcelain enamel—providing maximum high reflection surface.

COMFORT FOR INDUSTRY. Die-embossed apertures in reflectors provide 10% up-lighting for improved visual comfort and freedom from irritation and nervous fatigue due to eyestrain.

TURRET* SOCKETS. Sturdy, vibration-proof Turret sockets are standard equipment on all CFI DAY-LINEs—providing positive lamp seating and simple lamp installation or removal.

*®G. E. Co.



COOLER, CLEANER OPERATION. A gentle flow of air passes through the apertures reducing dirt and dust deposits. This "breathing" action keeps fixture cooler, cleaner and more efficient.

THE CFI DAY-LINE ON THE JOB. Note how uplighting cuts down uncomfortable brightness contrast. CFI DAY-LINE is available in 2 and 3 lamp (75W) open-end 8 ft. Slimline units; 2 and 3 lamp (40W) open- and closed-end 4 ft. RAPID START Fluorescent units; 2 lamp (90W) open- and closed-end 5 ft. Fluorescent units with NO-BLINK starters.

YOU'LL FIND THE DAY-BRITE REPRESENTATIVE IN YOUR AREA HELPFUL AND COOPERATIVE

REGIONAL SALES OFFICE
Matt Cabot
3718 Alameda de los Pulgas
San Mateo, California

ARIZONA, PHOENIX
R. E. Tweedy
P. O. Box 6313

CALIFORNIA, LOS ANGELES 12
H. R. Chilton
Day-Brite Lighting, Inc.
257 S. Spring St.

CALIFORNIA, SAN DIEGO 1
Ed. L. Peterson Company
709 Bank of Am. Bldg.

CALIFORNIA, SAN FRANCISCO 3
J. H. Brundage
288 Seventh St.

COLORADO, DENVER 2
C. D. Belt & Co.
1921 Blake St.

NEW MEXICO, ALBUQUERQUE
Alan Humphrey
1417 S. E. Princeton

OREGON, PORTLAND 8
R. M. Camnitz
P. O. Box 4166

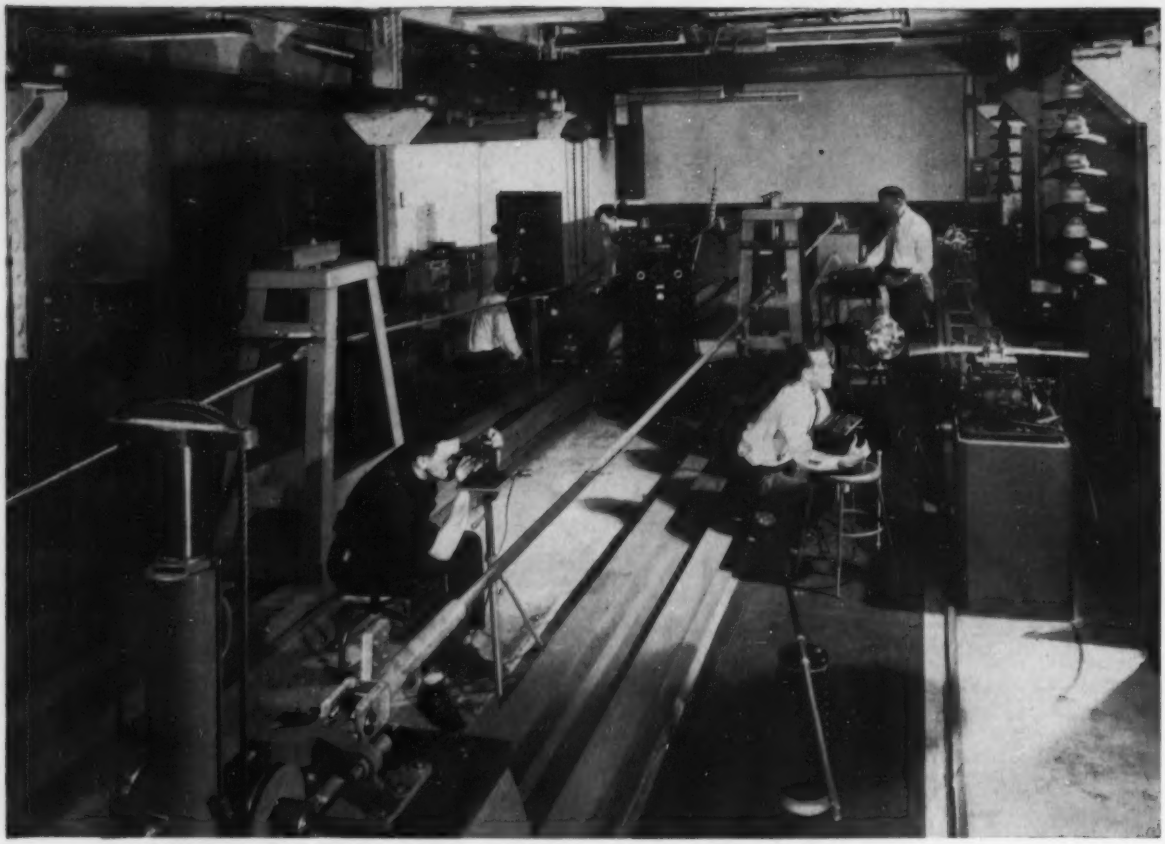
UTAH, SALT LAKE CITY
Stevens Sales Co.
P. O. Box 2338

458

"DECIDEDLY BETTER"
DAY-BRITE
Lighting Fixtures

Day-Brite Lighting, Inc., 5412 Bulwer Avenue, St. Louis 7, Missouri. In Canada: Amalgamated Electric Corp. Ltd., Toronto 6, Ontario.

NATIONALLY DISTRIBUTED EXCLUSIVELY THROUGH LEADING ELECTRICAL WHOLESALERS



Progressive Ideas...

backed by **EXTENSIVE RESEARCH** *and* **SOUND ENGINEERING**

insure the ultimate in **FIELD PERFORMANCE**

The "ultimate in FIELD PERFORMANCE" is the installation that assures the longest satisfactory transmission and distribution line life. In terms of armor-rod function, this means the best protection against line failure caused by:

1 — CONDUCTOR FATIGUE occasioned by a continuing increase in operating and maximum tensile stresses incident to the introduction of stronger conductors and the building of lines with longer and longer spans.

2 — ARCOVER BURNING at or near suspension clamps and LIGHTNING PITTING anywhere along the line.

3 — CORROSION AND CURRENT-TRANSFER PITTING within suspension clamps, at or near taps and under splices.

4 — UNDUE HEATING of taps, splices and so on, caused by the differential expansion of dissimilar metals or of metal stressed beyond its elastic limit.

It is almost impossible, in the case of a line failure, to isolate one or another of the causes, but with Preformed Armor Rods, it is not necessary.

PREFORMED ARMOR RODS by virtue of their inherent and unique characteristics effectively take care of all the above-mentioned problems. Conductors are relieved of mechanical stress at points of support. They are protected against burning, corrosion and overheating, and all of this is done at every point of application with almost unbelievable uniformity and consistency.

Preformed Armor Rods are today's... not yesterday's... answer for increasing conductor life.

For complete details of their outstanding and exclusive features, write or phone Cleveland: EXpress 1-3571.

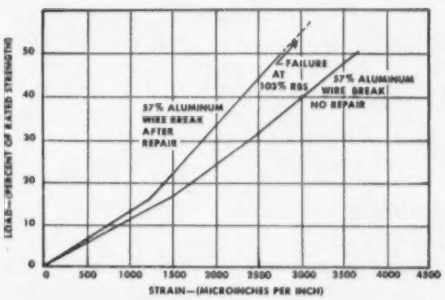
HOW Preformed Armor Rods LENGTHEN CONDUCTOR LIFE

★ The most vulnerable spot of a transmission line is under the suspension clamp. You can get no better armor protection than Preformed Armor Rods. They are always *uniform*—always do the same perfect job—factory engineered and factory formed—no variation in installation. Their intimate contact with the conductor provides the necessary reinforcement without any of the rub or chafe between rods and conductor, which you might expect in a looser installation. Furthermore, they will never loosen. They are not dependent on tightening of bolts which might crush the conductor if improperly applied—and which may become loose.

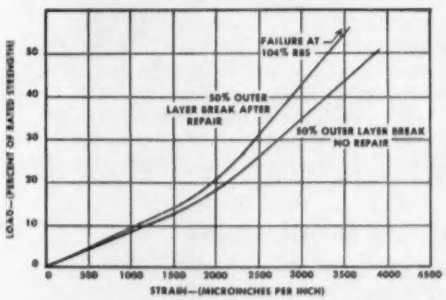
But this is only part of the story: While Preformed Armor Rods will provide the *best* and *safest* protection, they have another *unique* function—they do a job which only Preformed Rods can do. Regardless of armor efficiency, some vibration damage may occur. Should a strand failure occur at the suspension point, Preformed Rods will automatically take on the load, restoring strength and conductance—thereby continuing and lengthening conductor life.*

After all, your interest is in maintaining service—in continued functioning of your transmission lines. You need no longer consider the life of your conductor jeopardized by a strand failure. Preformed engineering has seen to this.

* Many have encountered vibration, chafing and burning failures on unarmored conductors and have used Preformed Armor for repairing and restoration of conductors at those points.


LOAD—(PERCENT OF RATED STRENGTH)
STRAIN—(MICROINCHES PER INCH)
FAILURE AT 103% RBS
57% ALUMINUM WIRE BREAK AFTER REPAIR
57% ALUMINUM WIRE BREAK NO REPAIR

Strength restoration of No. 4, 7 x 1 ACSR (rated breaking strength—2288 lbs.) by Preformed Armor Rods.


LOAD—(PERCENT OF RATED STRENGTH)
STRAIN—(MICROINCHES PER INCH)
FAILURE AT 104% RBS
50% OUTER LAYER BREAK AFTER REPAIR
50% OUTER LAYER BREAK NO REPAIR

Strength restoration of 795 MCM, 26x7 ACSR (rated breaking strength—31,200 lbs.) by Preformed Armor Rods.

These two charts tell the story. Irrespective of conductor size and construction, the clamping characteristics of PREFORMED Armor Rods result in restoration of the strength of damaged conductors to within at least 5 per cent of the rated breaking strength of the original conductors. And remember . . . only with PREFORMED Armor Rods . . . can laboratory tests accurately predict field service performance. There are no "average" installations.

PREFORMED LINE PRODUCTS COMPANY

5349 ST. CLAIR AVENUE • CLEVELAND 3, OHIO

TELEPHONE: CLEVELAND EXpress 1-3571

THE MONTH IN BRIEF

Partnership Plan

Portland General Electric Co.'s plan for "partnership" development of the John Day site on the Columbia contemplates financial help of other utilities, private and public, under a formula that would give them 50-year rights to energy output. Board Chairman Thomas W. Delzell reported that Oregon groups have expressed encouraging interest. He suggested that private and public agencies might advance $164,000,000 of the dam's $320,000,000 cost. About $36,000,000 would be a non-reimbursable federal contribution for navigation benefits and the remaining would be paid back to the U. S. Treasury with interest over a 50-year period. Uncle Sam would build, own and operate the dam as a unit of the Columbia River system. John Day has been authorized by Congress but no funds have been appropriated.

Regional Corporation Proposed

A federal nonprofit corporation to generate and market power in the Pacific Northwest has been proposed by Herbert Lundy, associate editor, the Portland *Oregonian*, as an "inevitable step" in implementing the administration's power partnership plan. (See p 136.)

Find Own Sources, Utilities Told

Private utilities and REA cooperatives in the Rocky Mountains will have to find sources other than federal plants for their growing power needs after 1956, Assistant Secretary of Interior Fred G. Aandahl told their representatives at a recent meeting in Denver. Meeting with private companies one day and REAs the next, he advised them both to begin planning steam plants immediately. There are two major federal hydro projects on the drawing boards—Yellowtail in Montana and Glendo in Wyoming—but they are many years away, he said.

Program Proposed for Wyoming

Stating that huge deposits of tungsten, titanium and uranium need electricity for full development, J. Elmer Brock, chairman of the Wyoming Natural Resource Board, proposed to private and public power officials in Casper, Wyo., that they unite behind a three-point program. It would include construction of: (1) a steam plant at Lake De Smet with a potential of 1,600,000 kw; (2) a 230-kv transmission line, 155 miles from Casper to Sheridan by way of Lake De Smet; (3) a 115-kv line from Lake De Smet to Glendo, site for a proposed USBR plant.

May Have Bearing

Full report is awaited on a recent U. S. Supreme Court decision that may affect Tacoma's Cowlitz Dam project. In another case the high court decided that the Federal Water Power Act does not supersede state laws authorizing water power use of navigable streams. The Washington State Supreme Court last year ruled that Tacoma held a valid license from FPC to construct the Cowlitz Dams despite a prohibiting state law, and this decision was upheld by the Federal Circuit Court of Appeals.

Application Tabled

Application of 14 PUDs and seven municipalities for permission to organize an operating agency under the 1953 Washington State Power Law was tabled by the State Power Commission. Walter S. Gordon, commission chairman, said his group had not had time to formulate a program or to know how such an agency would fit in. The commission was told earlier by its legal advisors that the proposed operating agency probably would outrank it in undertaking a new power development. With its approval, the commission could attach only such conditions as would be "reasonable" and within the provisions of the 1953 law.

Stockholders Meet in West

As this issue went to press, Westinghouse stockholders from all over the country were gathering for their first annual meeting in the West, to be held at Sunnyvale, Calif., on April 7. This meeting normally attracts between three and four hundred people. Expectation was that more than 1,500 would be at Sunnyvale.

Stockholders Approve

Stockholders of Mountain States Power and Pacific Power & Light Companies favor merger of the two by more than 99%, according to a vote of MSP shareholders at Albany, Ore., and a canvass of proxies of PP&L holders at Augusta, Maine. Final action by Pacific stockholders has been deferred until April 30 to comply with Maine laws governing filing dates for regulatory body hearings.

Chemicals From Coal

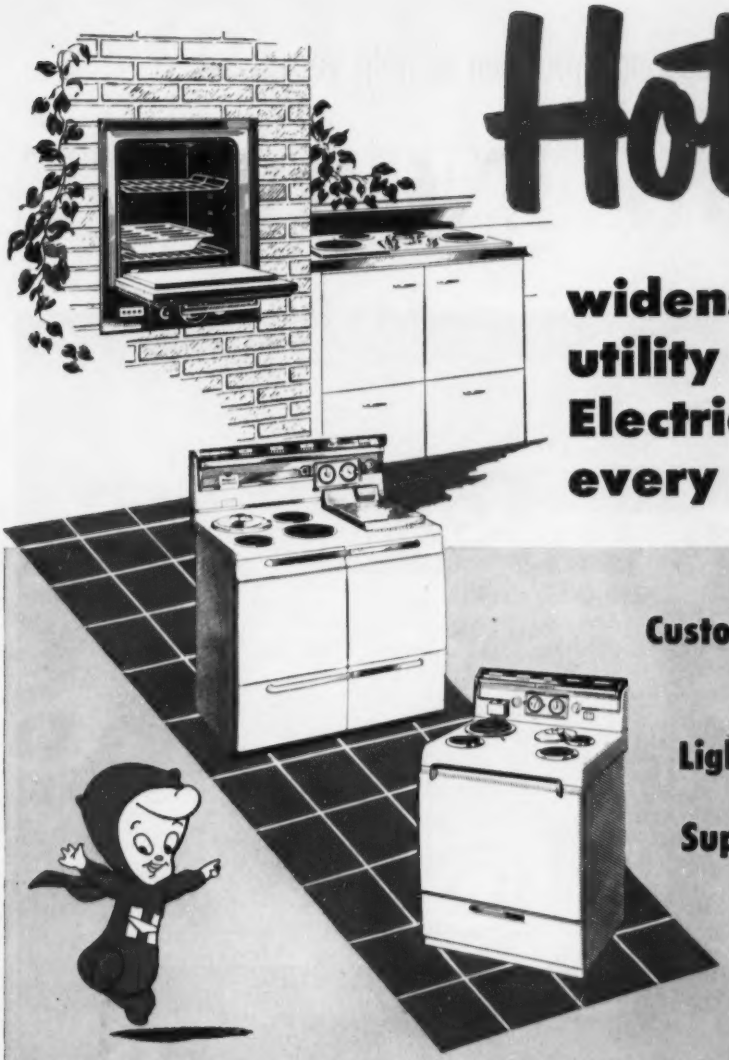
Utah Construction Co. is reported studying chemical possibilities in the coal deposits of northwestern Colorado. Construction of a steam plant to produce electricity for extraction of chemicals from coal has been suggested. The $50,000,000 project would be located on state coal lands. Utah Construction reportedly has assets of more than $23,000,000. Marriner S. Eccles, former Federal Reserve Board chairman, is a director.

Committee Gets List

Puget Power's Stockholders Committee is entitled to a list of the company's stockholders, according to Judge Francis J. Good of the Massachusetts Superior Court. His decision found that the officers and agents of Puget had refused to exhibit the stock books after proper demand and that the petitioning stockholders had no improper purpose in seeking the list. The committee, representing 25% of the outstanding shares, has objected to the company's action in letting the merger agreement with Washington Water Power Co. expire without submission to Puget shareholders.

Hotpoint

widens the source of utility revenue with Electric Ranges for every requirement



Custom-Sectionalized Range

Super De Luxe 39-Inch Lighted Pushbutton Range

Super-30 De Luxe Lighted Pushbutton Range

Hotpoint's complete line of 30- and 39-inch ranges, plus a modern custom-sectionalized line means that no matter what special requirement exists, or what range price the lady desires . . . Hotpoint has it.

Two fine new lines have been added to complement Hotpoint's line of highest quality 39-inch ranges. The Super-30 line and the Customline will be welcomed by thousands who will become new customers for electrical energy. The 3 new Super-30's at prices to fit every budget prove that saving space doesn't require sacrificing the wonderful de luxe features of larger Hotpoint models. The Hotpoint Sectionalized Custom Ranges provide an entirely new concept for modern kitchens, combining flexibility of design, efficiency, and economy.

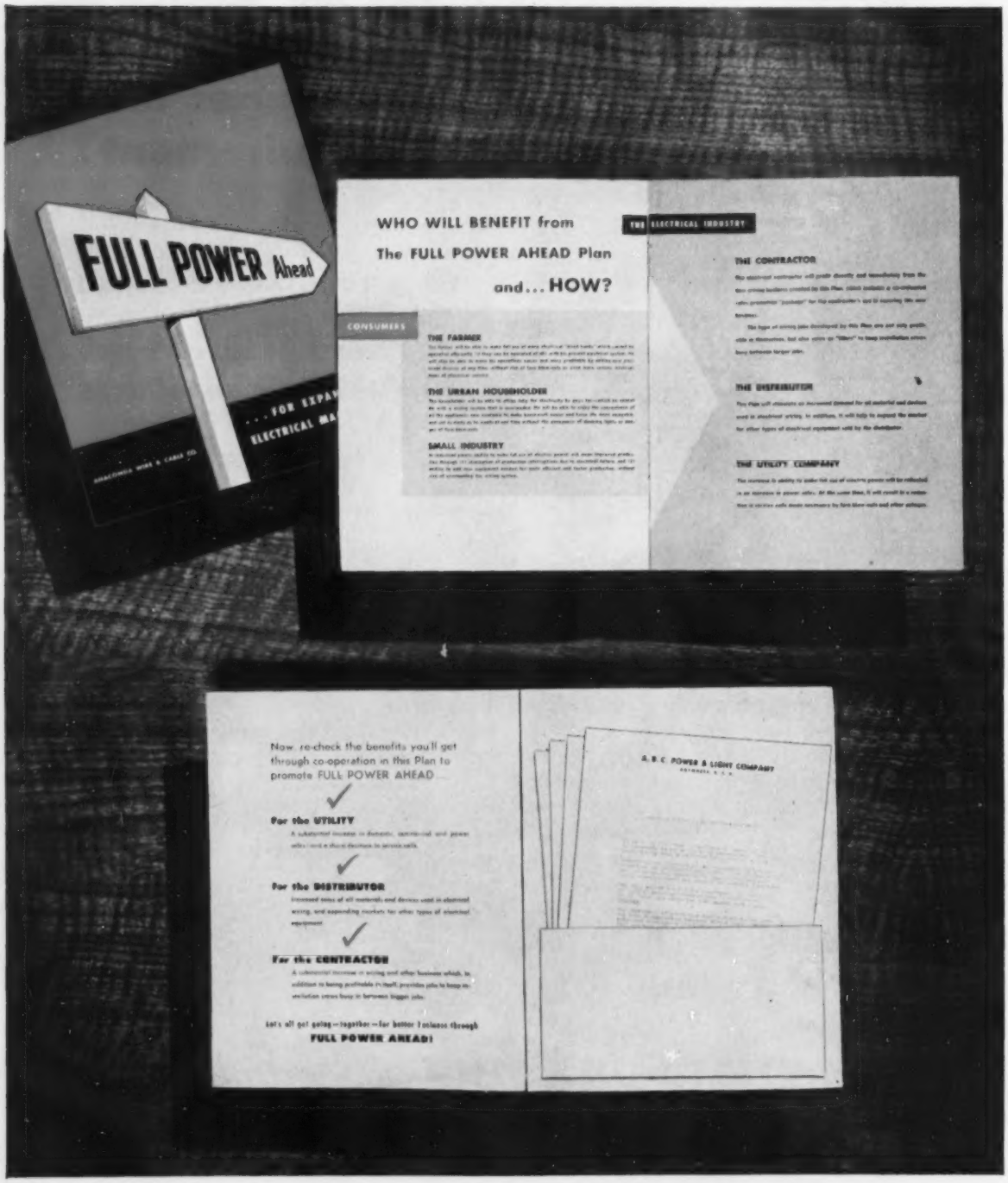
Learn the full story on this Hotpoint Range line from your Hotpoint distributor. See how Hotpoint is opening up new horizons for utility revenue.

Again Hotpoint *looks at Tomorrow, Today*

HOTPOINT Co. (A Division of General Electric Company) 5600 West Taylor Street, Chicago 44, Illinois

NOW! another new* Anaconda program to help you...

INCREASE



YOUR KWHR SALES *to*

- **HOMES**
- **FARMS**
- **SMALL INDUSTRIALS**
- **COMMERCIAL ENTERPRISES**

"REWIRE NOW!" is theme of new FULL POWER AHEAD Campaign. FREE sales literature is ready to help you promote *full* and more efficient use of electrical power . . . build load.

It's here now! Ready to lend a helping hand to electric power companies who want to encourage greater consumption of power in their territory. Anaconda's new FULL POWER AHEAD Campaign is all set to help you show your customers how to leap over the road block of inadequate wiring. Here's an effective way to educate commercial enterprises, industry, farmers, and homeowners how to make full, *unrestricted* use of electrical power. Logical result is to build profitable load for you . . . and cut down service calls from fuse blowouts and other outages!

FREE sales aids

Samples of suggested letters for mailing to your customers are ready now. Each "beats the drum" for wiring modernization . . . makes your customers more receptive to the efforts of distributors and contractors. These mailings, prepared especially for you, can, of course, be supplemented by any campaign already being sponsored by the cooperating utility.

How to sell the modernization hold-outs

The standard excuse for not rewiring is "can't afford it!" THE FULL POWER AHEAD kit shows how to break through this sales resistance by taking advantage of property improvement loans under FHA Title 1. Just as this has helped others clinch sales, it can help get your customers to rewire now! It's another good reason to get your complete kit.

How to join the FULL POWER AHEAD Campaign

The Anaconda District Sales Office in your area can supply you with all campaign promotional material . . . give you full information about the new FULL POWER AHEAD Plan. Many contractors and distributors have started their mailings. Tie in your promotion with theirs . . . and watch your kwhr sales grow. *Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.*

54418

INCREASE SALES OF POWER TO LARGE INDUSTRIALS, TOO!

Anaconda has reactivated its successful POWER-UP Campaign. This plan tells industrial plant executives that THERE NEVER WAS A BETTER TIME THAN NOW TO MODERNIZE THEIR PLANT WIRING SYSTEMS. Your Anaconda District Sales Office has the complete story. Investigate today!

ANACONDA®

Primary and secondary distribution cable • building, machine tool, control and communication wire • portable cords and cables • bus-drop cables • apparatus cables • copper, aluminum, copperweld conductors • wire and cable accessories.

• **Once again Anaconda takes the lead in industry-wide promotion.** 1936 — Industrial Modernization. 1941 — Preventive Maintenance. 1946 — Wire Ahead. 1950 — Power Up — And Be Prepared. 1953 — Full Power Ahead.

QUICK SERVICE FOR GROWING WEST — *Anaconda's integrated plant at Orange, California, assures western industry of quick, sure service on wire and cable for every kind of application. Contact Anaconda Sales Office at: Los Angeles, San Francisco, or Seattle.*

what's NEW in Engineering

A carbon dating process developed by the University of Manitoba is said to make it possible to date – within 10 years of actual age – any matter containing radioactive carbon from as far back as 40,000 years. A liquid scintillator is used. The material to be dated is incorporated in the liquid. There it sets up light flashes which are measured by an electronic eye. The sample is destroyed in the testing process.

Pre-cast, tilt-up walls, soil testing and analysis, uniform spacing of bays and a dead level roof all played important roles in Kaiser Engineers' research, design and construction of Westinghouse's newest – and largest – commercial lighting fixture plant. The result: a building suited in every respect for its intended purpose, and one constructed at an unusually low cost per square foot. For further information on this and other major Kaiser Engineers' projects, write us at the address below.

A cold weather blow torch, weighing just 6½ ounces, is claimed to operate efficiently at temperatures down to –70F. The torch pre-heats its own combustion air and a separate tank supplies fuel.

Widely diversified engineering talents and experience are available to every Kaiser Engineers' project. Departments include civil, structural, electrical, mechanical, architectural, process and production, mining and geology, metallurgical and chemical – and all work closely together. Call or write to Kaiser Engineers Division of Henry J. Kaiser Company, Kaiser Building, Oakland 12, California.

THIS MONTH'S NEWS

Dispute in Idaho Over Power Initiative

Printing and proposed distribution at federal government expense of 180,000 pieces of propoganda favoring a public power and communications proposal in Idaho is the latest development in a dispute over a measure branded as "socialistic" by the state's governor, Len Jordan.

Congressman Harold Patten, Democrat of Arizona, has permitted the use of his franking privilege to circulate in Idaho excerpts from the Congressional record. Congressman Patten inserted into the Congressional record material furnished him by Asher B. Wilson of Twin Falls, Idaho, principal sponsor of the initiative on power and communications. He then ordered the reprints and had the envelopes prepared.

The so-called "Idaho Power and Communications Development Bill," should it succeed at the Nov. 2 general election, would put the state into the power and telephone business.

Those opposing the bill point out that nowhere, in the entire measure, is there a definition of communications. There is only the word of the sponsors that it does not involve radio stations, newspapers, television stations, press wire services, telegraph companies, brokerage wires, or any other use of electronics in communications, it is pointed out.

The initiative would give the state the power to buy, construct or acquire by condemnation any electrical generating facilities it wished to own. The state would operate such facilities. The employees of such facilities would be state employees. The state could issue revenue bonds to pay for the facilities. The state could do the same with the telephone companies in Idaho.

And, according to the initiative, the only control over this procedure would be vested in a five-man commission, and these five men would be elective—not appointive—officers.

The address given on the stationery of the people circulating the initiative petitions is 613 Idaho Street, in Boise. That is the Labor temple. The secretary-treasurer of the organization circulating petitions is Elmer F. McIntyre. He is also secretary of the Idaho State Federation of Labor.

The name of the circulating group is Idaho Citizens' Legislative Committee Inc. However, when it incorporated, organized labor's seven central councils in Idaho were polled for their support. Only three of them replied. Of these, two councils favored it.

The argument advanced by those circulating the petitions for the 25,000 signatures necessary to get the proposal on the ballot is this:

"This petition should be signed by all qualified Idaho citizens who believe telephone rates are too high, or who are interested in a reduction in their electric power bills, as well as in the orderly development of the water resources of Idaho."

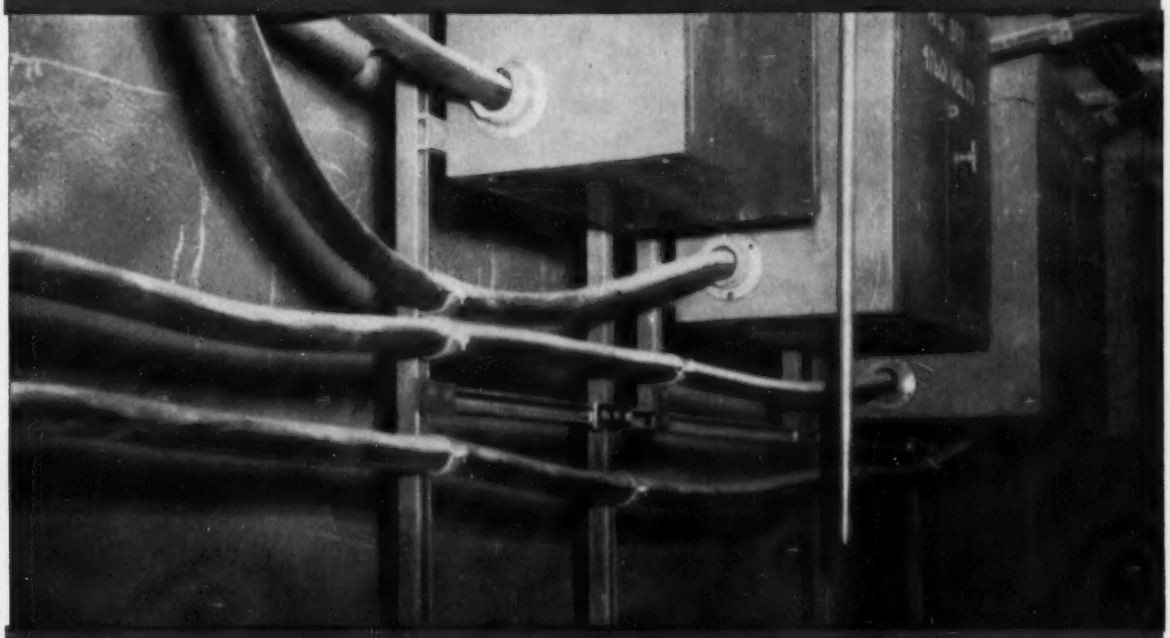
Idaho Power Denies Hells Canyon Report

Report circulated by the National Hells Canyon Assn. that the Brownlee site on the Snake River is not suitable for construction of a dam by Idaho Power Co. drew a prompt denial by the company. The report was written by Ed Emerine of the *Idaho Farm Journal.*

The company produced the following abstract of testimony of Dr. Harold T. Stearns, consulting geologist, before the Federal Power Commission in Washington, D. C.:

"The Brownlee site has been extensively drilled. Both abutments are formed of mostly bare columnar-jointed Columbia River basalt of the Miocene age. It is extraordinarily hard lava flow. In all of Dr. Stearn's experience he has never seen a flow as massive as there is in the foundation of the Brownlee site. In drilling they were unable to find natural breaks in the rock often enough to pull the core and it was necessary to snap off many of the cores at 5-ft intervals to drill the hole. The foundation is excellent. Most of the rock needed for the rock-filled dam will come from the spillway and powerhouse excavations. The balance, about 20%, can be obtained from a quarry adjacent to the dam. There are excellent foundation conditions for the spillway. The rock is hard and durable. There are adequate deposits of sand and gravel just upstream from the dam in the river. It is unlimited in quantity and foundation conditions for the power house are very suitable."

SEEN



but not heard (from)

A lot depends upon a trustworthy high voltage distribution system. Should this cable carrying 4160 volts from substation to circuit breakers fail, the cost in terms of lost production and work hours would far exceed the price of a new cable.

However, the chances of this cable failing are almost negligible. Why? Because it's a Simplex high voltage feeder cable. It's insulated with the famous Anhydrex XX insulation.

If your high voltage cable insulation is extremely resistant to heat and aging, is not affected by ozone, and is guaranteed not to absorb more than 15 milligrams of water per square inch when soaked for 7 days at 158° F., you're paying for ordinary insulation. If it offers this guarantee *AFTER* being aged for 7 days at 250° F., you're getting the best insulation — Anhydrex XX.

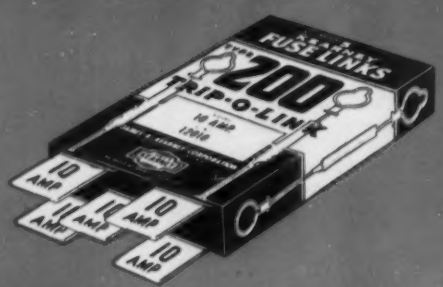
Insulation with a low water-absorption and oxidation rate stands a better chance of keeping its electrical properties, thereby assuring longer service. That's what you want in high voltage feeder cable. That's what you get with Simplex-Anhydrex XX. Write for bulletin Number 1009-A.

Simplex—ANHYDREX XX

SIMPLEX WIRE & CABLE CO., 79 Sidney St., Cambridge 39, Mass.

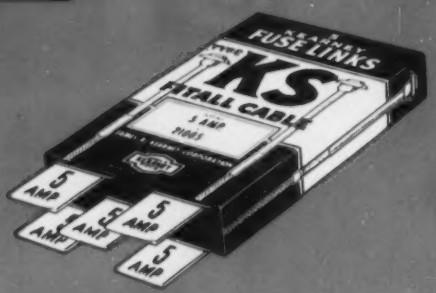
SAVE SAFELY on KEARNEY

4 Specialized types for maintaining



KEARNEY Type 200

Specially made for troublesome circuits that are subject to long-time overloads and surges. Overloads up to 130% can be carried indefinitely without damage to fuse link or cutout.



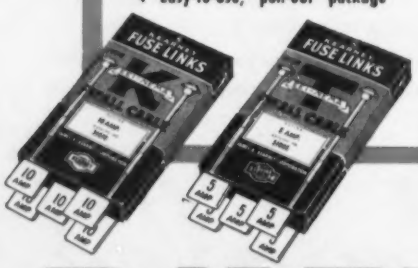
KEARNEY Type KS

Specially designed to protect and still keep outages at a minimum on circuits subject to switching and lightning surges. KS overload capacity is identical with Type 200, but surge capacity is twice as great.

Standardized types for EEI-NEMA Standards

In cooperation with EEI and NEMA, KEARNEY has developed K (fast) and T (slow) fuse links to meet industry-wide, time-current standards . . . *in addition* to giving you such exclusive KEARNEY features as:

1. True mechanical interchangeability
2. Greater accuracy and dependability
3. Packages are color-coded (gold for Type K—silver for Type T) to assure fool-proof identification and save time on the job
4. Easy-to-use, "pull-out" package

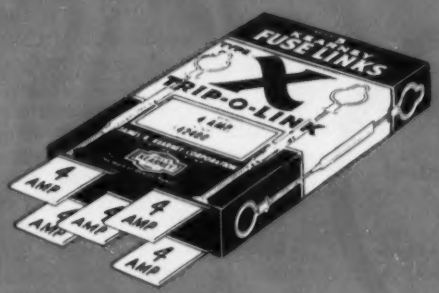


MAYDWELL & HARTZELL, *INCORPORATED*
WEST COAST DISTRIBUTORS
Los Angeles • San Francisco • Portland • Seattle • Spokane • Phoenix

JAMES R. KEARNEY CORPORATION
ST. LOUIS, MO.
GUELPH, ONT.

Specify KEARNEY

peak load protection
FUSE LINKS
service on troublesome circuits



KEARNEY Type X

A specialist at keeping transformers in service during heavy overloads and surges... yet clears the fault before damage range is reached. Opens 230% of rated current within five minutes.

KEARNEY Type QA

The QA link is designed to open at a lower percentage of rated current, and therefore will melt more rapidly than fuse links of the same ampere rating which have been designed to open 230% of rated load within five minutes.

Keep your troublesome circuits operating even under most difficult conditions—by re-fusing with KEARNEY links. They will save you more in maintenance—and do it *safely*. Equipment gets full protection from overloads and surges.

All KEARNEY links are color-coded to save your crews time and trouble, packaged for easy handling, and made with the accuracy you need for top protection. Time-current curves and charts are available to help you work out your coordination problems.

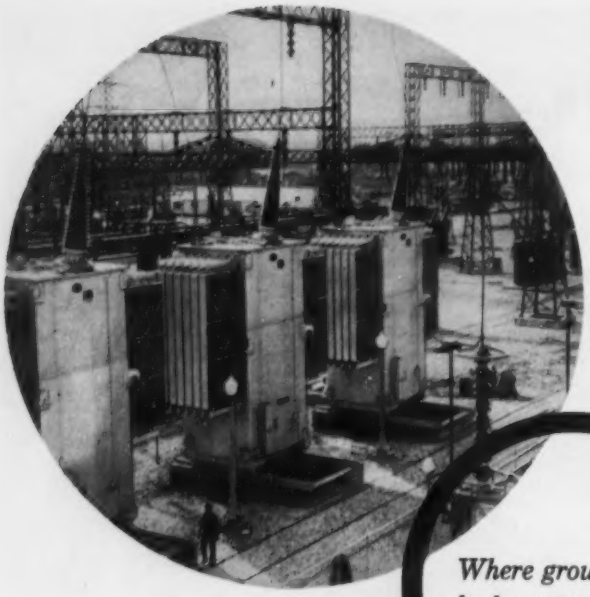
JAMES R. KEARNEY CORPORATION

4224-42 Clayton Avenue • St. Louis 10, Missouri

Canadian Plant: Guelph, Ontario

FOR BETTER CONSTRUCTION • FOR SAFER MAINTENANCE

Products



Where ground must be kept **BARE** *of weeds and grasses...*

BORASCU®
WEED KILLER

BORASCU is the answer to your weed problems! Use this weed killer about stations, transformer and yard areas, fence lines, pole yards-lines, and all places where ground should be kept bare of fire-hazardous and unsightly vegetation. BORASCU destroys and prevents regrowth! A single application may keep an area cleared for 1 to 2 years! And this low-cost material is SAFE... nontoxic, nonflammable... won't corrode ferrous metals. Try it!

So Easy to Apply...

NO MIXING...
NO WATER TO HAUL
•
NONPOISONOUS
•
NONCORROSIVE
•

Write for Literature Now! **PACIFIC COAST BORAX CO.**
DIVISION OF BORAX CONSOLIDATED, LIMITED
630 SHATTO PLACE • LOS ANGELES 5, CALIFORNIA

ERDAHL IS DISMISSED BY TACOMA UTILITIES BOARD

The Tacoma, Wash., Public Utilities Board has dismissed C. A. Erdahl as acting director of public utilities and appointed Dean Barline, assistant city attorney, to fill the post until a permanent successor can be named.

Barline named Henry Cole, chief project engineer for Tacoma City Light, as superintendent of the light division to succeed J. Frank Ward, who became managing director of the Washington State Power Commission earlier this year. Cole, a University of Washington graduate, has been with the department since 1922.

Erdahl had served as head of the city's utilities nearly 11 years, 10 of them by election as commissioner of public utilities, a post abolished by charter changes last year. He had been serving as acting director and had been regarded as a leading contender for a permanent appointment to the position until the board, several days before dismissing him, declared him out of the running. The board asked Erdahl to resign but, failing to receive his resignation in 24 hours, announced his dismissal. It said it has narrowed the field of 78 applicants for the post to four, all from outside the state.

In a three-page open letter Erdahl, who also is chairman of the Northwest Power Pool, challenged the board's grounds for his removal. Board members declared that Erdahl lacked engineering and administrative ability. In his statement, he pointed to his ten years as an elected head of the utilities.

Erdahl replied to the board's statement that the utility's net income was "dangerously low although the gross income was increasing" by pointing to the increase in the amount of power purchased from the Bonneville Power Administration, and general economic conditions.

Walter S. Gordon, Tacoma consulting engineer and chairman of the State Power Commission, speaking as a taxpayer, charged the other four members of the board had been influenced by Chairman Gerrit Vander-Ende. Gordon also charged that the action was a part of a move to put Tacoma utilities under the city manager, rather than having them under a utilities' director. None of the other applicants for the position measure up to Erdahl, Gordon declared.

Erdahl's dismissal also brought protests from four past presidents of the Northwest Public Power Assn. and Bob Jones, Seattle city councilman.

In electrical installations *where QUALITY counts* use CONDULETS*

Quality does count in practically every electrical conduit installation that you make. When you use CONDULETS you know that you are putting in electrical equipment of the highest quality, because CONDULETS have been doubly tested. . . in the factory and in the field.

Crouse-Hinds quality control assures a long-lasting product and field records prove it by the test that only time can give. Thousands of CONDULET installations are still in tip-top condition after twenty, thirty, or even more than forty years of dependable service.

The illustration at the right shows four of Crouse-Hinds' basic quality features that are common to all CONDULETS. The fifth, Wedge Nut Fasteners, is an exclusive Crouse-Hinds feature that has made Obround CONDULETS preferred by electricians everywhere.

Type EVA Explosion-Proof Lighting Fixture

Type ARE Arktite Receptacle Equipment

Type FS Condulet With Pilot Lamp Receptacle, Switch and Plug Receptacle

Type GUAC Explosion-Proof Junction Condulet

1. **Taper tapping.** Condulet threads are taper tapped to match tapered conduit threading. Makes a rigid joint that will not loosen. This assures permanent ground continuity . . . important for safety.
2. **Integral bushing.** A smooth rounded surface protects wire insulation.
3. **Material.** Feraloy . . . a special alloy that is strong and tough, resists corrosion, and gives sharp, full threads
4. **Finish.** A triple treatment provides long-lasting protection . . . exceeds Federal and U. L. specifications.
5. **Wedge Nut cover fastener.** Clear cover opening . . . no projections. No loose parts . . . Wedge Nuts and screws self-retained. No screw holes to align.

More than 15000 items are listed in the Condulet Catalog including a complete explosion-proof and dust-tight line for use in hazardous locations.

On your next job, use CONDULETS . . . they're made right to last longer.

**CONDULET is a coined word registered in the U. S. Patent Office. It designates a product made only by the Crouse-Hinds Company.*

Type VC Vaportight Industrial Lighting Fixture

Type FLF Explosion-Proof Manual Motor Starting Switch Condulet

Type EPC Explosion-Proof Motor Starter and Circuit Breaker Condulet

A Nationwide Distribution Through Electrical Wholesalers

CROUSE-HINDS COMPANY
Syracuse 1, N. Y.

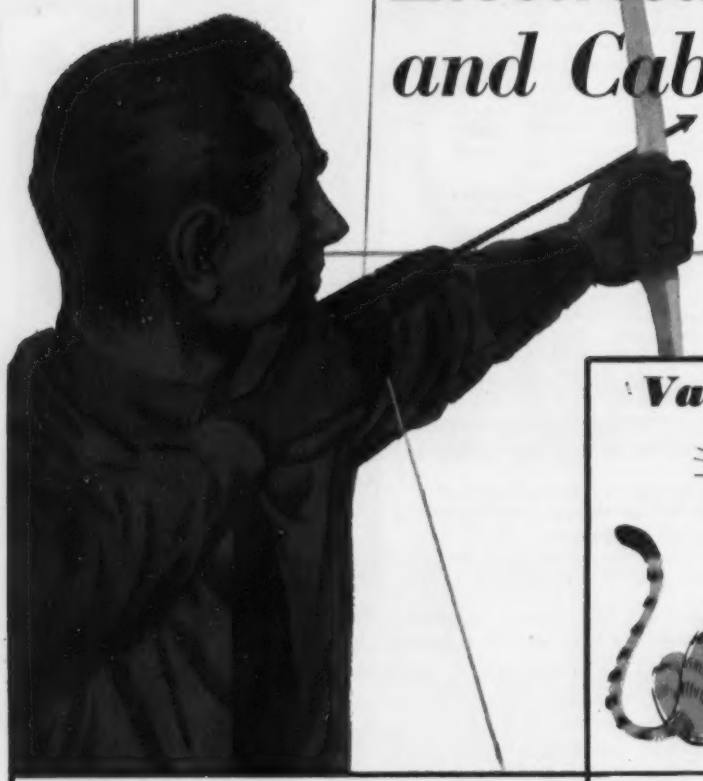
OFFICES: Birmingham — Boston — Buffalo — Chicago — Cincinnati — Cleveland — Dallas — Denver — Detroit — Houston Indianapolis — Kansas City — Los Angles — Milwaukee — Minneapolis — New Orleans — New York — Philadelphia Pittsburgh — Portland, Ore. — San Francisco — Seattle — St. Louis — Tulsa — Washington.
RESIDENT REPRESENTATIVES: Albany — Atlanta — Baltimore — Charlotte — Corpus Christi — Richmond, Va. — Shreveport Crouse-Hinds Company of Canada, Ltd., Toronto, Ont.

CONDULETS · TRAFFIC SIGNALS · AIRPORT LIGHTING · FLOODLIGHTS

You just can't miss with

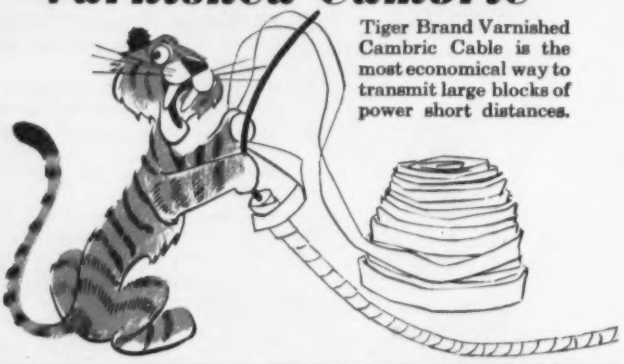
Tiger Brand

Electrical Wire and Cable



Varnished Cambric

Tiger Brand Varnished Cambric Cable is the most economical way to transmit large blocks of power short distances.



Amerclad

To withstand physical abuse, moisture, sun and oil, use Tiger Brand Amerclad for all sorts of portable equipment.

Amerbestos

Tiger Brand Amerbestos is a true *quality* heat resistant material. The asbestos is *felted* for greater durability.

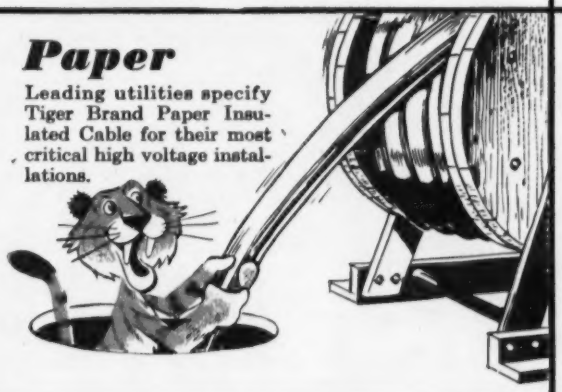
Submarine For underwater power distribution, there's a Tiger Brand Submarine Cable to withstand any operating condition.

Ampyrol

Tiger Brand Ampyrol features thin-walled thermoplastic insulation, brilliantly color coded, easy to strip.

Paper

Leading utilities specify Tiger Brand Paper Insulated Cable for their most critical high voltage installations.



American Steel & Wire *specializes* in wire and cable that must withstand abusive service. No matter what kind of operating condition you may have, there is probably a *standard* Tiger Brand Wire or Cable that will give you better service than you ever dreamed of.

Send the coupon and outline your problem. We'll see that you get service—*fast.*

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL CORPORATION, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

A STANDARD TIGER BRAND CABLE FOR EVERY SPECIAL JOB

- asbestos wire and cable
- mold cured portable cord
- aerial, underground and submarine cable
- shovel & dredge cable
- paper & varnished cambric cable
- machine tool & building wire
- special purpose wire & cable

SEND THE COUPON

American Steel & Wire
Room JE-44, Rockefeller Building
Cleveland 13, Ohio

● Please give me more information about Tiger Brand Wire & Cable for .....

Name.....
Firm.....
Address.....
City.....State.....

U·S·S Tiger Brand ELECTRICAL WIRE & CABLE USS

UNITED STATES STEEL

Introducing **..the PENGO safety TRANSFORMER GIN**

RUTTER DESIGN

made of molded FIBERGLAS

STRENGTH-WEIGHT RATIO 3 TIMES THAT OF STRUCTURAL STEEL

SAFEST Moisture proof! Will not absorb moisture even when abused. High electrical resistance—tested to over 100,000 volts, and . . .

STRONGEST Each Gin tested to 4500 lbs. single line pull.

LONG LIFE Nearly indestructible. Impervious to sun, heat, cold, water, oil, most acids, corrosion, rotting.

EXCELLENT DESIGN Goes up the pole in one piece. Pivots for moving transformers from old pole, or installing bank of transformers.

SPECIFICATIONS

Working load, single line	2500 lbs.
(One-third more with double line)	
Length	6' 2"
Weight	35 lbs.

PETERSEN ENG. CO.
Santa Clara, Calif.
Dept. E
Rush me more information on the new PENGO Fiberglas Transformer Gin.
Name.....
Address.....
City.....

Made by the makers of the World-Famous PENGO EARTH AUGER

PETERSEN ENGINEERING CO.
Santa Clara, Calif.

the Emblem of Quality since 1875

FARADAY

No Confusion here . . .

NECK-TYPE BELLS

VIBRATING HORNS

There's *order* in this plant—and in the many, many other factories and offices equipped with Faraday signals and systems. They stop confusion and save steps, paging and signaling clearly and faithfully, day-after-day, year-after-year.

For generations, Faraday engineers have designed bells, buzzers, horns, chimes and complete systems to meet an endless variety of signaling needs and sound level requirements.

Consult your electrical wholesaler for details on the complete Faraday line.

HOLTZER-CABOT **FARADAY** STANLEY & PATTERSON

CONSOLIDATED BY:

SPERTI FARADAY INC. ADRIAN, MICH.

BELLS · BUZZERS · HORNS · CHIMES · VISUAL AND AUDIBLE PAGING DEVICES AND SYSTEMS

UTILITIES OFFER TO FINANCE POWER FACILITIES

Pacific Power & Light and Mountain States Power Co., presently in process of merger, have offered to finance power facilities for Green Peter Dam on the Santiam River in western Oregon if Congress will implement the flood control project authorization to embrace the Eisenhower plan of partnership hydroelectric resources development.

The offer was reported to the House Public Works committee in Washington. D. C., March 19 when officers of the South Santiam Development Committee appeared with the blessing of Rep. Harris Ellsworth (R-Ore.).

Max Landon, Sweet Home, Ore., businessman, told House committeemen the Oregon organization working for flood control has obtained agreement with the companies to share in the costs of the project. A letter from officers of both companies was placed in record by Landon. It stated the companies would bear such proportionate share of the costs of construction, operation and maintenance of the dam and reservoir as might appropriately be allocated to power.

The Corps of Engineers estimates cost at $47,000,000 for the main structure and a regulating dam. If power phases were authorized, the corps estimates, the structures and pool would provide 96,000 kw.

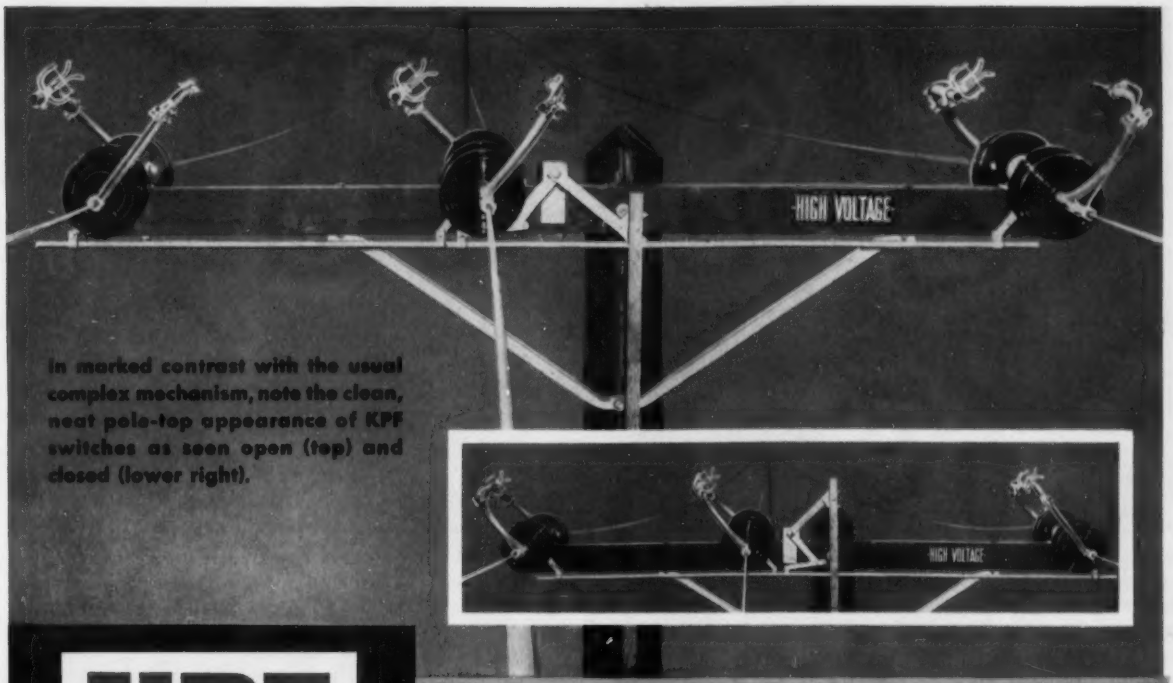
Regional Corporation Proposed for Northwest

In a talk before the American Society of American Military Engineers, Herbert Lundy, associate editor, the Portland *Oregonian*, called for early action on the partnership plan to take the political heat off power.

To implement the plan, he proposed a federal nonprofit corporation, which would generate and market power in the Pacific Northwest. He believes the regional corporation should have revenue bond financing authority as well as full power to join with the federal government in building new multipurpose projects that include power features. It should sell energy at the lowest possible uniform rates to public and private agencies on the basis of equality, he thinks.

He believes the administration's partnership plan says in essence: This much we have done for you . . . you must do the rest.

Without a regional corporation, the partnership plan may lead to eventual dismembership of the regional power system, he stated.

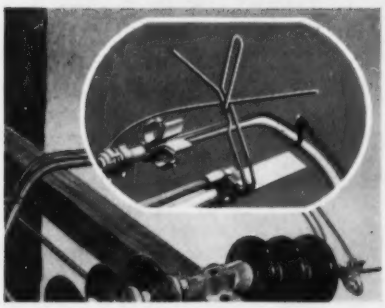


In marked contrast with the usual complex mechanism, note the clean, neat pole-top appearance of KPF switches as seen open (top) and closed (lower right).

KPF

AIR BREAK SWITCHES

Standard for nearly half a century



Since KPF pioneered the Quick-Break attachment over 5 years ago, leading utilities have been dropping up to 40 miles of 69 kv line without dangerous arcing. KPF Quick-Breaks have a heavy-duty cat's whisker that whips free in a split-second as the switch is opened. Establishment of an arc is prevented; hence, critical arc length is not a problem. KPF Quick-Break attachments are available from stock for all KPF switches built since 1940.

2826

Here's why service-proved KPF switches give more years of trouble-free switching

KPF Air Break Switches look different because they *are* different. They are the simplest air break switches made. They consist of two rigid dead-end insulator assemblies with rigid jumpers forming the switch arms. One assembly is mounted stationary to the cross-arm. The other rotates to make and break the circuit. There are no complex parts to get out of order, require lubrication, adjustment or other service. Once installed, sturdy KPF switches serve indefinitely.

Simple design also means simpler manufacturing and lower cost. No separate dead-ends or extra insulators are required.

Finally, installation time is less than half normal. Phase units are shipped ready for use and need only be bolted to the cross-arm.

KPF Air Break Switches have been used for almost 50 years on lines ranging from 7.5 to 110 kv. Tens of thousands are in use today by Pacific Gas & Electric, Southern California Edison, Minnesota Power & Light and other leading power companies.

For the world's simplest, surest, lowest cost air break switch, specify KPF—standard for nearly 50 years.

New catalog gives complete specifications, detail drawings, installation information.

KPF ELECTRIC COMPANY

1624 East Alpine Avenue, Dept. W-2, Stockton 5, California

LOGS PASS DAM—Albeni Falls Dam on the Pend Oreille River near Newport, Wash., is believed to be the first permitting passage of logs. Arriving at the dam's forebay, logs are yarded into guide booms which direct them into a 50-ft tunnel through the rock island on which rests the dam's nonoverflow section between spillway and power house. Boommen with pike poles work the logs two or three abreast into the mouth of the tunnel, where they pass through without further help. A reinforced concrete trough 400 ft long, 6 ft wide and 10 ft deep carries the logs from the tunnel to quiet water below the dam, at a rate of approximately 400,000 log ft of logs per eight-hour day. At left above, the booming yard above the dam contains 750,000 log ft of timber with another pocket already through the chute. The power house at left center is nearing completion. At right, boommen guide logs into tunnel on the upstream side of the dam. Chute control gate is operated by gantry crane at upper left

Large-Scale Program Advised in Seattle

A serious power shortage may be expected by 1959 or 1960, declares the Seattle Chamber of Commerce in a report recommending that Seattle City Light undertake an immediate large-scale program to enlarge its generating capacity.

Seattle's peak load this winter was 633,000 kw and it is expected to increase to 1,000,000 kw in 1960, said the report. City Light's present generating capacity is 530,000 kw and it is expected to increase to 700,000 kw by 1960. Bonneville Power Administration makes up the present difference between capacity and demand but may not be able to do so in the future, the report stated.

Since five or six years would be required to build a large new hydroelectric project, work would have to start now, it was pointed out. A steam power plant could be built in less time but would cost an estimated 6 mills per kwh, as compared to about 2 mills for hydro.

"It is not necessary that City Light go it alone," said the report. "Joint development of additional power sources, stream or hydro or both, by City Light and Tacoma City Light or other agencies may well be desirable."

Paul J. Raver, City Light superintendent, pointed out that the department has an expansion plan that calls for an additional 90,000-kw generator in the Ross power house and a higher dam at Gorge to increase capacity of the Gorge plant. The city also has applied to the FPC for permission to develop the Boundary site on the Pend Oreille River across the state.

City Approves Funds for Atomic Energy Plant Site

After being assured by Paul J. Raver, City Light superintendent, that atomic-produced electricity "would fit in very well in the Pacific Northwest in conjunction with hydroelectric generation," the Seattle city council approved funds for purchase of a site upon which an atomic steam generating plant ultimately may be constructed.

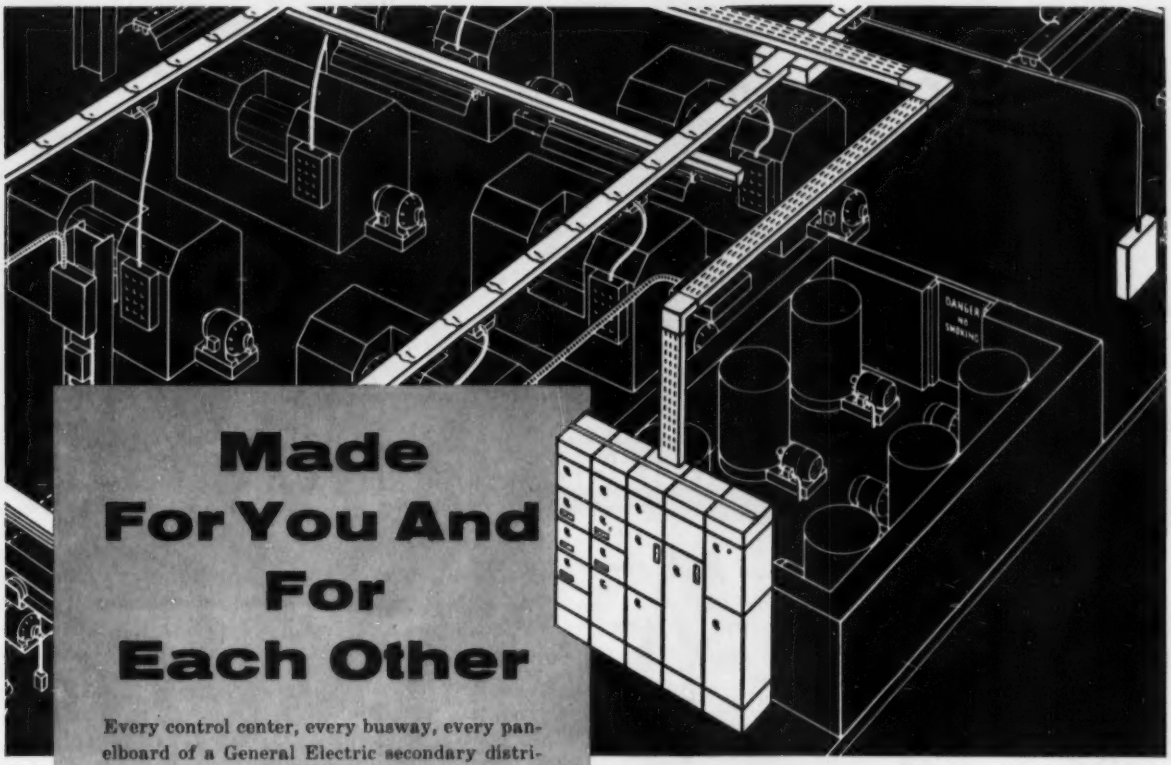
During discussion on the site, Raver was asked to comment upon the experimental atomic plant being constructed by the Duquesne Power & Light Co. in Pittsburgh. He pointed out that the method, still experimental, "involves essentially the use of a byproduct, heat, for the generation of power." Power produced under present atomic technology would be interruptible, in that each year would have some 30 periods of 48 hours' duration each, when production would be interrupted. Need in the Pacific Northwest, Raver declared, is for a firm supply of power.

The 37-acre site would be used partly now for a large new substation to receive Skagit River power, with room for later construction of a steam-generating plant, if desired.

• **Chelan County PUD,** Wenatchee, Wash., has asked FPC for a preliminary permit for a hydro development on the Chewawa and Wenatchee Rivers in Chelan County. The proposed project would include a rockfill dam, creating a reservoir with about 350,000 acre-ft of useful storage, and a 10,000-kw power plant.

• **United Water Conservation** District of Santa Paula, Calif., has filed application with FPC for license for a proposed hydro development in Ventura and Los Angeles Counties. It would be located on Piru and Sespe Creeks and their tributaries. The district expects to sell the power to a public utility.

• **Moloney Electric** Co. won the contract for a three-unit-bank autotransformer for Bonneville's Glen H. Bell substation near Spokane. Basic bid was $403,650. A similar bank already installed at the substation was built by Moloney.

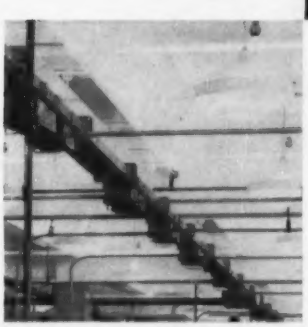


Made For You And For Each Other

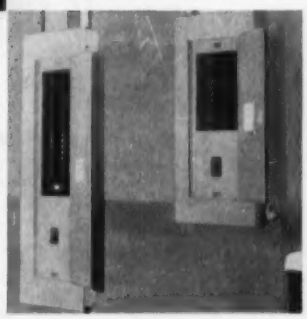
Every control center, every busway, every panelboard of a General Electric secondary distribution system is a leader in its field in its own right. Put them together and you gain still more from *complete integration*. For all these products are engineered to work together as a *system* . . . all the way from transformer to point of use. This is your complete assurance of *all* the flexibility, reliability and safety that can be built into this vital area.

G-E Motor Control Centers provide convenient, compact grouping of motor starters, other control equipment and feeder protection. They assure maximum safety, adaptability and convenience.

G-E Busway Systems fit the needs of each load area, yet permit system expansion with factory growth.



G-E Lighting & Distribution Panelboards, fusible or circuit-breaker types, provide positive circuit control and protection.



FOR COMPLETE INFORMATION, WRITE GENERAL ELECTRIC COMPANY, DISTRIBUTION ASSEMBLIES DEPARTMENT, PLAINVILLE, CONN.

Make it G.E. all the way through the vital low voltage area from transformer to point of use.

GENERAL ELECTRIC

For Dependable Service Connections
60 years
Porcelain Products Wireholders
...the "BUY" word to BETTER insulators
1933 Popular Light Duty Size
1927 One-piece screw and bail.
1980 Copper-ball reinforced. Round Base.
1982 Copper-ball reinforced. Oval Base.
1929 Popular Standard Duty Size
1931 Tough Heavy Duty Size
1984 Steel-ball reinforced. Screw-assembled "Semi-Float" action.
1986 Steel-ball reinforced. Rigid screw.
ALL PORCELAIN
METAL REINFORCED
45 STYLES AND SIZES TO CHOOSE FROM
60 years
The best and broadest line
. . . insures customer satisfaction!

You *get what you want,* in Porcelain Products' wireholders—45 styles and sizes to choose from! Quality, too—sharp, clean threads that speed installation—large, smooth wireways that protect conductors. A name that *means* reliability!

Known and accepted the world over! You can rely on the old, established line of wireholders—Porcelain Products. A good name is priceless. Write for detailed literature.

ELECTRICAL PORCELAIN SINCE 1894

PP INC

Porcelain Products, Inc.

FINDLAY, OHIO

TACOMA HOPES TO DOUBLE GENERATING CAPACITY

In an effort to double the electric generating capacity of Tacoma City Light, the Public Utilities Board has authorized immediate investigation of every possible source of power, Chairman Gerrit VanderEnde said recently. He pointed out that charges that the Cowlitz project was "being junked" were unjustified and declared that the project is still very much in the picture. "However," he added, "for too many years nothing has been done to investigate other sources of power potential for the city."

H. A. Cole, newly appointed superintendent of City Light, warned the board that "if conditions become such that the Cowlitz cannot be built or is indefinitely delayed, it will become imperative that every possible source of power be brought into generation as quickly as construction conditions permit."

Board members approved VanderEnde's suggestion that a five-year program be instituted at once to double Tacoma's generating facilities within that period if possible. Two immediate possibilities will be studied: (1) Construction of a diversion dam on the south fork of the Snohomish River and a connecting tunnel to Cushman Reservoir No. 1. This would add 24,000 kw continuous load to the system without cost of another turbine generator; (2) construction of a diversion dam below the present La Grande power house on the Nisqually River with a canal or closed conduit to the power site four miles away.

Cost on Utilities Center Reported at Tacoma

The Tacoma, Wash., Utilities Board has received the figures it requested on the cost of building a utilities center, now virtually complete.

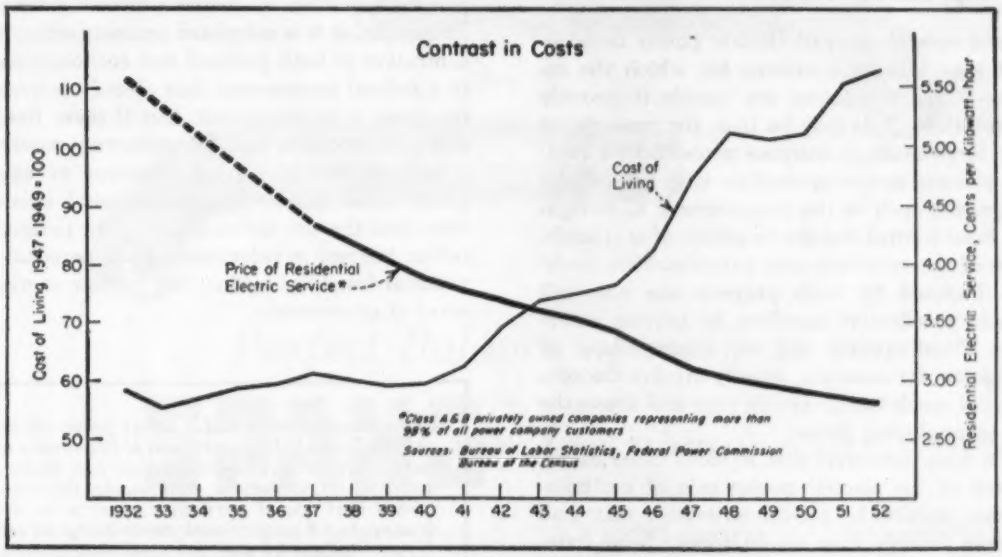
The project cost will be $4,426,084 when facilities now planned are complete, said C. A. Erdahl, acting utilities director. This does not include $366,078 for furniture, fixtures and shelving or a $461,951 warehouse originally proposed but for which plans now have been shelved.

The board has been concerned about the cost of the center, started before a governmental change-over brought it into being. Principal structure in the center is a 130,000-sq-ft administration building costing $2,485,076. Erdahl emphasized that all building expenditures complied with state laws and Federal Power Commission requirements.

A 20-YEAR RECORD . . .

The Electric Power Companies' Case for Public Confidence

An economic study of the record of the investor-owned electric power companies of the United States over the past twenty years underwrites their claim to public confidence today. A key factor of this record is set forth by the chart in the middle of this page. This shows that while the cost of living as a whole has almost doubled, the average price of electric energy for residential use in the United States has been cut in half.



The average prices of industrial and commercial power also are much lower than they were twenty years ago.

Such a study confirms the record on other key accomplishments of the electric power companies during the past two decades.

They have not failed, either in peace or war, to meet the nation's rapidly expanding electric power requirements. In paying tribute to the performance of these companies during World War II, J. A. Krug, Director of the Office of War Utilities, said, "Power has never been too little or too late." The same can be said for the entire period of the past twenty years.

To be ready with enough power – on time – the electric power companies have expanded their production fourfold since 1933. This has required an investment of over $17 billion in new facilities. To raise the funds for this investment they have enlisted the participation of about 3 million direct stockholders. Through life insurance companies, banks and similar institutions, about 90 million Americans – more than half of the nation's total population – have become investors in electric power companies. By thus relying on private investment for their expansion, the power companies have provided their

plant and operating equipment without burden on the taxpayer.

In addition, the investor-owned companies have paid about $12 billion in taxes to various governments – national, state and local – over the past twenty years. Unlike government-owned and -operated systems, they have received no public subsidies. When taxes and subsidies are taken into account, the rates for electricity charged by the investor-owned companies have been as low as, or lower than, those charged by government-owned and -operated systems.

Many Americans do not appreciate the job that the power companies have done over the past two decades. That is due, in part, to the public memory of financial abuses by some utility holding companies during the 1920's. This memory obscures a clear and unprejudiced view of the progress since those days. And some of the all-out advocates of reliance on government rather than on regulated private enterprise for the development of our power resources do their best to keep this memory of the past alive in the present.

An Impressive Case

Some special cases of electric power development may involve problems for which the investor-owned companies are unable to provide full solutions. This may be true, for example, of some large multiple-purpose projects that combine electric power generation with related developments such as the improvement of navigation, flood control and the irrigation of arid lands. Some of the economic and administrative problems imposed by such projects are not well adapted to effective handling by private enterprise. Flood control and the improvement of navigation, for example, usually involve the provision of much costly service over and above the cost of producing power.

It is true, however, that in some cases development of the electric power side of multiple-purpose projects by private enterprise may well be more feasible than would appear from statements by some government power advocates. And the record indicates that even in those projects on which both the power generation and the other services are handled by public authority, it may well be desirable to have the investor-owned companies assume the transmission and distribution functions.

Our study of the record of the investor-owned and -operated companies over the past twenty years has led us, of course, behind the statistics that bear on the wisdom of giving them a priority in the development of our power resources. It reveals that these enterprises are manned by people who, through lifetime experience, are peculiarly conversant with the needs of the communities they serve. They have given the consumer notably good service while conforming to standards set and enforced by public regulatory commissions. They have won the confidence of the investing public. By their nature and their experience they are competent to handle any power program that can be demonstrated to be economically sound.

The Paramount Public Interest

By their economic performance during the last twenty years, the electric power companies have earned the confidence of the public. By relying on these companies to meet its electric power requirements the public will fully protect its economic interest in ample and efficient service at fair prices.

That is where our study comes out. Our findings do not touch the political consideration that private operation of electric utilities under public regulation is a safeguard against further concentration of both political and economic power in a federal government that already commands too great a concentration. But if these findings make an economic case for preferring power development by tax-paying business as against power development by governmental agencies, they clear the way for an appeal to the paramount public interest in safeguarding our personal and political freedoms against the further encroachment of government.

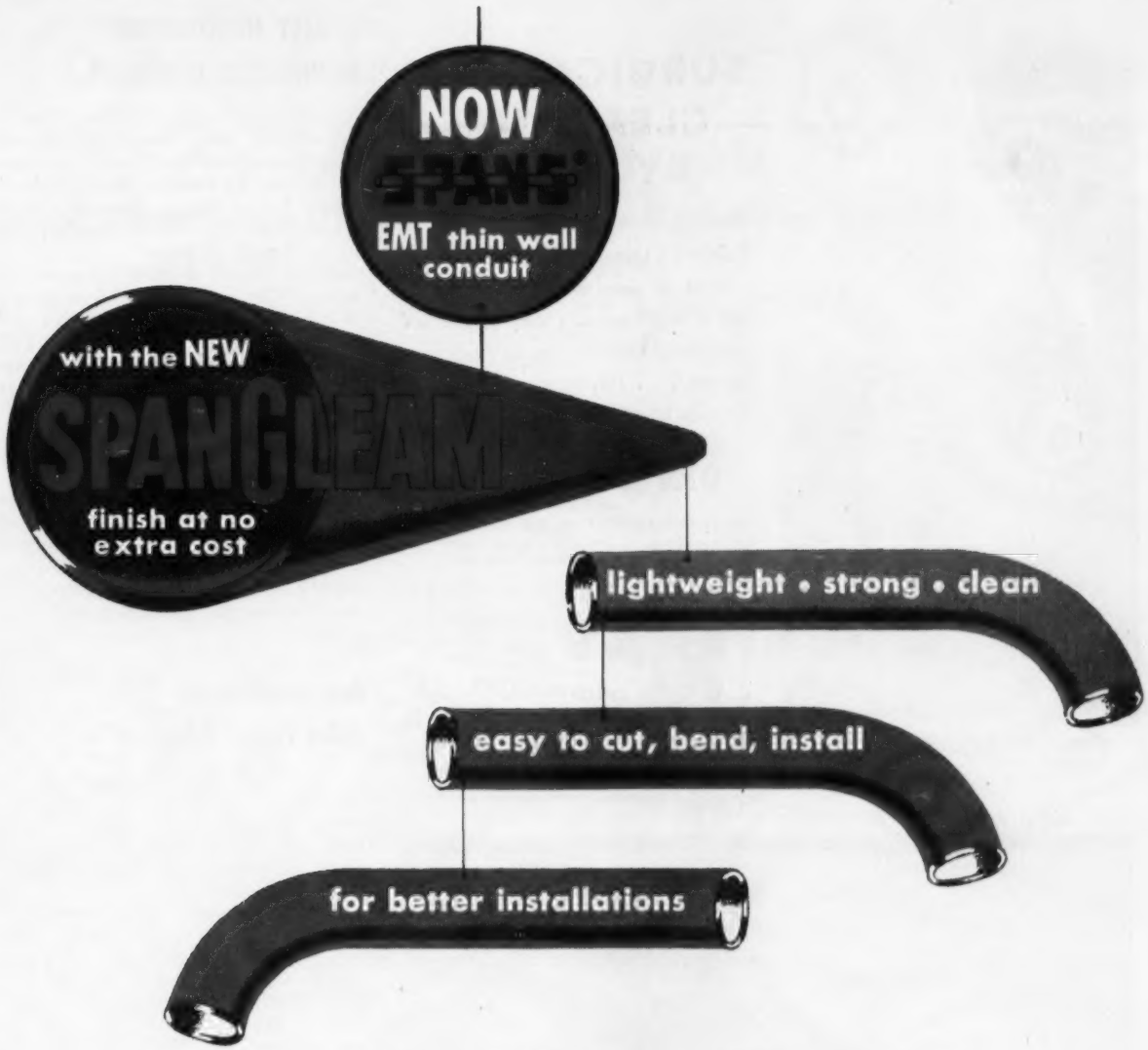
This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments that are of particular concern to the business and professional community served by our industrial and technical publications.

Permission is freely extended to newspapers, groups or individuals to quote or reprint all or parts of the text.

Donald C. McGraw

PRESIDENT

McGRAW-HILL PUBLISHING COMPANY, INC.



Perfect Balance at work at your SPANG® *Distributor's showroom*

Next time you stop in at your Spang Distributor's showroom take a look at this new SPANGLEAM EMT mobile display. Here's an outstanding example of perfect balance at work. The display also tells you why SPANGLEAM EMT is the finest thin wall electrical metallic tubing you can buy. That's because there is . . .

Perfect Balance at work in SPANGLEAM EMT

SPANGLEAM EMT is made from top-quality steel, carefully controlled during manufacturing, scientifically finished inside and outside and thoroughly inspected to give you a perfect product. This balance between top-grade material and top-grade workmanship means that SPANGLEAM EMT saves you time . . . gives you profitable installations.

Take a look at the SPANGLEAM EMT display . . . then try SPANGLEAM EMT on your next installation. You'll prove it to yourself that SPANGLEAM EMT is best!

SPANG® CONDUIT

SPANG-CHALFANT
Division of The National Supply Company
GENERAL SALES OFFICE:
TWO GATEWAY CENTER, PITTSBURGH, PA.
District Offices and Sales Representatives in Principal Cities

Overhanging branches removed and trees shaped properly for Utility in Beverly Hills

SURGICAL LINE CLEARANCE BY DAVEY

Davey is doing line clearing for 12 Public Utilities on the Pacific Coast —most of them served continuously for over 20 years. Davey specialized equipment and efficient methods save money . . . Davey surgical pruning benefits trees—builds goodwill.

DAVEY LINE CLEARING
DIVISION OF
DAVEY TREE SURGERY CO., LTD. OF CALIFORNIA
Russ Bldg., San Francisco, SUtter 1-3377
Story Bldg., Los Angeles, TUcker 1929

UTILITY NEGOTIATING BONNEVILLE CONTRACT

California-Pacific Utilities Co. is negotiating with Bonneville Power Administration for a 20-year contract to obtain Columbia River federal power for its system through a new transmission line the company plans in its Oregon division.

Leon Gray, district manager at Baker, Ore., reported the company negotiations with BPA were in the final stages in early March. Plans call for Calpac to construct a 69-kv transmission line from BPA's substation at La Grande to the Calpac substation in Baker. Cost plus switching equipment is estimated in excess of $50,000.

Calpac is one of nine private utilities eligible for long-term contracts with the agency and conclusion of negotiations would make it the seventh private utility to sign for long-term BPA power delivery contracts since the Eisenhower administration took office.

Appropriation Cuts Will Delay Project Schedules

Trimming of civil works funds by the House appropriations committee means one-year delays in schedules at both The Dalles and Chief Joseph projects, according to Corps of Engineers spokesmen.

The corps originally recommended $30,000,000 for Chief Joseph and $45,000,000 for The Dalles but these figures were trimmed to $27,000,000 and $34,100,000 respectively by the Budget Bureau. The House committee dropped The Dalles to $29,000,000 and, although Chief Joseph will get the amount proposed by the Budget Bureau, present schedules for generators No. 5 to No. 12 will be upset.

The committee proposes: $24,000,000 for McNary Dam and lock; $29,000,000 for The Dalles (with notation that there were $6,000,000 in unexpended balances and unobligated funds available); $27,000,000 for Chief Joseph; $3,000,000 for Lookout Point reservoir.

• **California Electric Power Co.**, now entering its 50th anniversary year, led the nation's private electric utilities in percentage of customer growth during the past five years, with a 45.15% increase in customers, Vice-president and General Manager Carl C. Ernst reported at the utility's 39th annual meeting held in Riverside, Calif., recently. He said construction of unit four at the company's Highgrove steam plan would start this year.

for your substation switching requirements...

CHANCE Type H

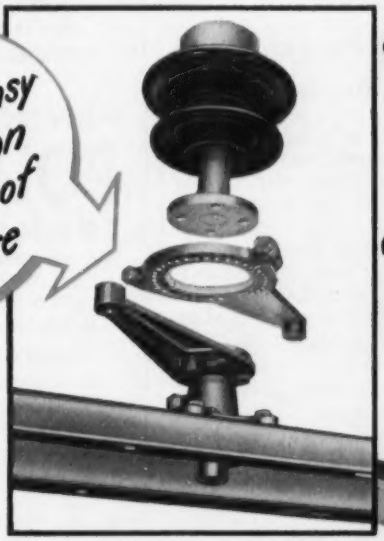
High Pressure–Group Operated–Rotating Stack Switches

7.5 through 230 KV.—400—600—1200 Amps

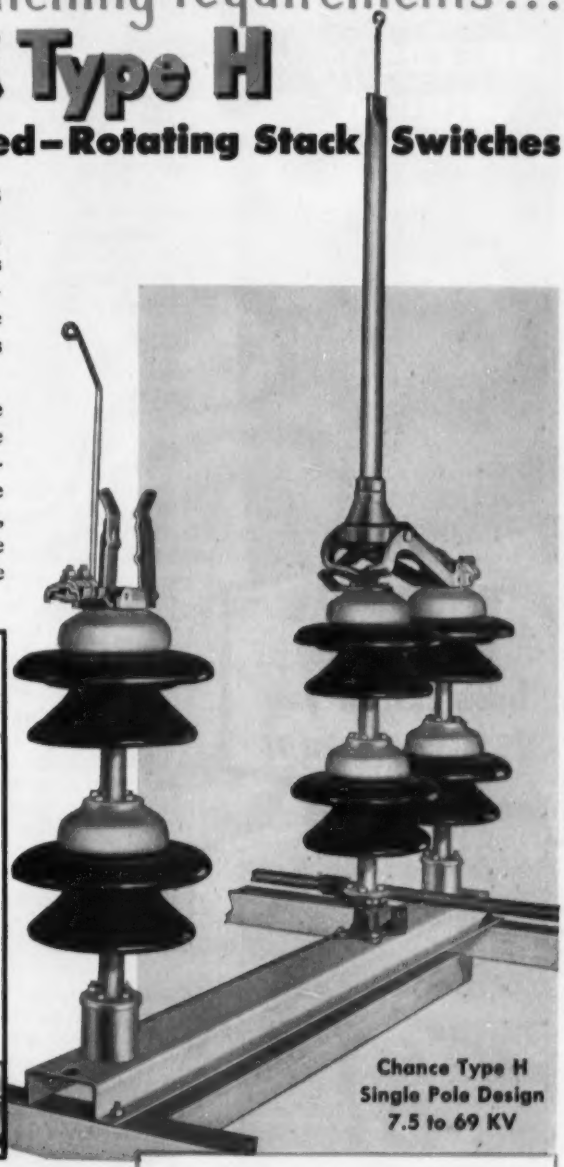
Chance Type H Outdoor Group Operated Airbreak Switches have only three moving parts. This means years of dependable service in any kind of weather—without maintenance or attention. These switches have sufficient leverage to break heavy ice accumulations with ease.

Both the hinge and clip end of the switch are equipped with constant high pressure contacts. The hinge connection is completely enclosed and maintains high pressure at all positions. The blades close with a rotating wiping motion that makes a clean, high pressure, copper to silver contact. Ribs on the contact clips hold the blade firmly under extreme short circuits or surges.

Here's why Type H is easy to install on any type of structure



This universal control crank has screw point recesses at 10° intervals. Controls can be adjusted within 5° of any position... the control mechanism can be readily adapted to any type of structure.



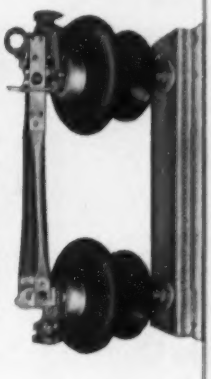
Chance Type H Single Pole Design 7.5 to 69 KV

The versatile Chance Type H Switch has all the features necessary for dependable switching operations on today's heavily loaded systems. Type H is manufactured in voltage ratings from 7.5 through 230 KV—400 to 1200 amperes.

Look to Chance for your substation switching needs. Write for complete information and prices.

HOOK STICK DISCONNECT SWITCHES

Chance Hook Stick Switches cover a range from 7.5 through 115 KV, 400–600–1200 Amperes. All meet NEMA and AIEE requirements and all pass most severe tests for high currents, icing, insulation characteristics and long life.



ABC INDUSTRIES

A·B·CHANCE CO.

CENTRALIA, MISSOURI
SAN FRANCISCO, CALIFORNIA

CS54-5

PLUGMOLD SPEEDS Outlet **WIRING**

For your next outlet job, use Plugmold! One installation will SHOW you that Plugmold is the easiest, fastest, cheapest way to provide the many outlets your customers WANT! Send for the Plugmold booklet . . . better still, get a 20-foot Introductory Package of Plugmold today!

WIREMOLD builds better business for you . . . at a profit!

WIREMOLD one-piece construction **makes wiring EASIER**

Wiremold's one-piece construction makes installation easy . . . requires no special tools or gadgets. Four sizes for every wiring job, whether new wiring, or modernizing present wiring. Write today for full information.

WIREMOLD products are backed by a firm guarantee. See page 7 of Wiremold Catalog No. 19.

The WIREMOLD Company
HARTFORD 10, CONN.

HYDRO COSTS, BENEFITS MAY BE SHARED WITH CANADA

The Northwest Governor's Power Policy Committee is considering plans for sharing benefits and costs of proposed hydro developments with Canada, according to J. Frank Ward, managing director of the Washington State Power Commission and chairman of the committee's subcommittee on suggested studies and objectives.

At the suggestion of R. E. Sommers, B. C. minister of lands, Ward's subcommittee has proposed studies of power developments, including an analysis of the benefits that either country would receive from projects in the other's territory.

The International Joint Commission is empowered to study some phases of Columbia River development but has no authority to consider sharing of benefits, Ward explained. The principle that downstream plants should pay for benefits from upstream storage already has been established in the United States, he pointed out.

British Columbia Planning Large Columbia Development

Construction of a large hydro and industrial development on the Columbia River is expected to start during 1955, according to the Hon. R. E. Sommers, minister of lands and forests for British Columbia. Sommers made this announcement after detailed conference with General A. G. L. McNaughton, chairman of the Canadian section of the International Joint Commission, which has been carrying out surveys in the Columbia River area since 1944 at a cost of $3,000,000.

Pivot of the project will be a 600-ft-high dam and generating plant at Mica Creek, high point in the bend of the Columbia River. The dam will cost approximately $425,000,000, and Sommers stated that the power would attract aluminum, titanium and other metallurgical industries to the area. These industries, combined with timber, ore, gas and oil, he claims, will transfer the Kootenay area into a booming industrial territory. While the project is expected to be started before the end of 1955, it is estimated that it will require seven years to complete.

Sommers said that for years past the Pacific Northwest United States had been trying to get British Columbia to build storage dams in the Columbia River area. The Mica Dam, high up at the bend in British Columbia would even out the flow of the Columbia and add 2,750,000 hp to existing structures in Washington, increasing their power capacity by 30 to 40%, he stated.

Sommers said that one of the points still to be worked out was the distribution of the financing of the project from an American standpoint. International agreement in regard to the water rights, financing and construction, must be smoothed out before definite progress can be made, he explained.

The Mica Creek Dam would be about 75 miles north of Revelstoke and would be No. 1 in a series of nine dams that eventually would be developed on the Canadian side of the border on the Columbia and Kootenay Rivers.

• **A subcommittee** of the House Interior and Insular Affairs Committee will conduct hearings on proposed $200,000,000 Trinity River project in California next month.

LIGHTER! SMALLER! MORE EFFICIENT!

★

PENNSYLVANIA POLE STAR TRANSFORMERS

now available in every distribution size

3 through 500 kva
480 volts through 67,000 volts

In new installations or replacements, Pole Star Transformers are ideally suited to today's distribution needs. They are smaller, lighter, more efficient . . . embodying a patented lapped core that takes full advantage of the outstanding flux-carrying capacity of cold-reduced, oriented electrical steel.

J. G. CORRIN
600 S. Highland Avenue; Los Angeles
VAndike 5533

GEO E. HONN CO.
420 Market Street, San Francisco
SUtter 1-7252

PGE OPENS BIDS FOR UPPER CLACKAMAS DAM

Portland General Electric Co. was to open bids April 8 for the general contract for construction of Timothy Meadows Dam on the upper Clackamas River. Cost of the project is estimated at $2,000,000.

The dam, located on the Oak Grove fork of the river, will add some 10,500 kw of firm power capability for three downstream Clackamas River plants. Work is expected to start by June 1, when it is possible to enter the Mt. Hood National Forest area, now snowed in.

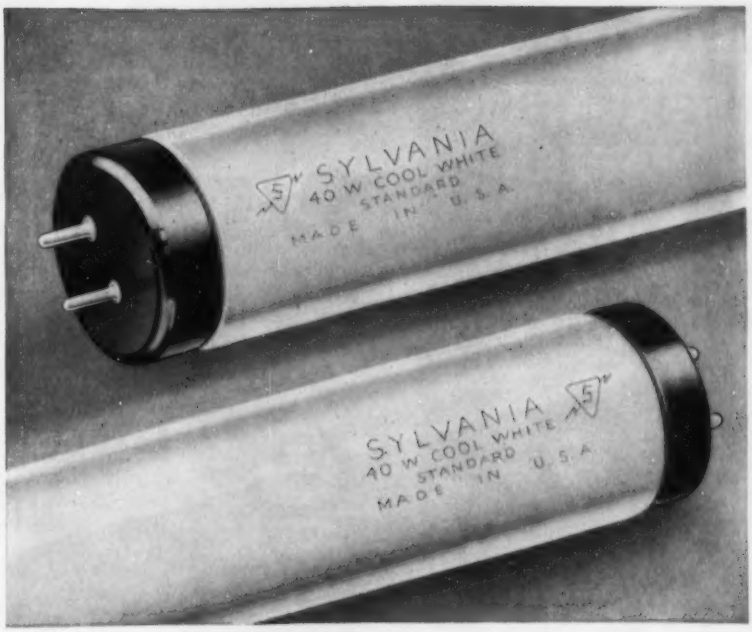
Damsite clearing is nearly completed, and separate bids will be called later for clearing the 1,600-acre reservoir site.

Seattle, PUD Confer On Conflicting Plans

Representatives of Seattle City Light and the Pend Oreille PUD have been conferring on conflicting projects for power on the Pend Oreille River. City Light several months ago filed application with FPC for the so-called Boundary site, just south of the Canadian border. The PUD says any Boundary site development other than a low dam would flood out its Z-Canyon site. The Z-Canyon site is between the Boundary site and the Box Canyon site, where the PUD already has a 60,000-kw development underway. Mining interests also oppose any large power development on grounds their claims would be flooded.

• **Stolte Inc.** of Oakland, Calif., was apparent low bidder on a project to complete the final phases of construction of Folsom Dam power plant on the American River near Sacramento, Calif. The firm, one of 10 bidders for the job, offered $852,516.89 compared to the Bureau of Reclamation's estimate of $915.459. Work will include installation of three 55,000-kw turbines and a switchyard. Bureau officials said it is hoped to have the first generator in operation by Feb. 15, 1955 and the two others should follow at 90-day intervals.

• **B. Napier Simpson,** general manager of the Canadian Electrical Manufacturers' Assn., has issued a strong protest against the action of B. C. Electric Co. in placing a $3,000,000 order for submarine power cables in Britain. Simpson said the order came under the category of dumping and was a threat to the Canadian electrical industry.



with Sylvania
Fluorescent Lamps, you sell
Longer Lasting Brightness

Sylvania Fluorescent Lamps contain STABILIZED PHOSPHORS . . . an exclusive coating achievement enabling the lamps to provide a longer-lasting brightness now than they ever did before. This actually amounts to a "Bonus of Light" worth more than the cost of the lamps themselves. That's why Sylvania can cover its lamps with this money-back assurance.

Tell your customers about this latest Sylvania engineering advancement. For the complete story write Sylvania, Dept. 4L-2604 or call your Sylvania representative.

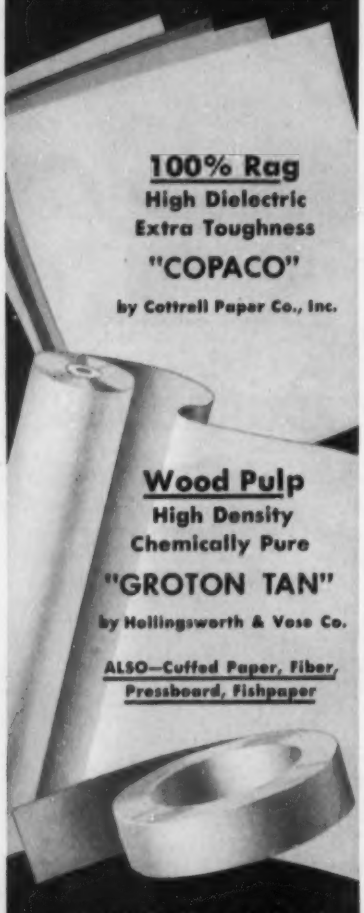
Try 24 Sylvania Fluorescent Lamps of any popular type. If, in your opinion, they don't give more light and maintain color and brightness for a longer time than any other brand, send them back with your signed Certificate of Assurance and your money will be refunded.

Sylvania Electric Products Inc., 1740 Broadway, New York 19, N. Y.
215 MARKET STREET, SAN FRANCISCO 5, CALIF.

ELECTRICAL INSULATING PAPERS

Sheets
Rolls
or Coils

ALL WIDTHS AND THICKNESSES



100% Rag
High Dielectric
Extra Toughness
"COPACO"
by Cottrell Paper Co., Inc.

Wood Pulp
High Density
Chemically Pure
"GROTON TAN"
by Hollingsworth & Vose Co.

ALSO—Cuffed Paper, Fiber, Pressboard, Fishpaper

★ FABRICATE AND SAVE

Make your own insulation parts to suit your production needs with these TOP BRAND PAPERS available at

TRI-STATE
SUPPLY CORPORATIONS

LOS ANGELES 13 • 544 South San Pedro St. Mutual 2354
SAN FRANCISCO 7 • 554 Bryant Street Exbrook 2-8890
SEATTLE 4 • 318 Occidental Avenue Main 4161

COLORADO PS ASKS FOR FAIR NEW RATE

Public Service Co. of Colorado has asked the State Public Utilities Commission to determine the company's fair evaluation and then fix a fair new rate on electric power and steam.

Officials of the company in their application did not estimate the amount of rate increase needed. A spokesman said: "All we are doing is to request a thorough study and the subsequent establishment of a fair return rate. We cannot suggest the rate. This is a PUC decision."

J. E. Loiseau, company president, said the petition was the first in the company's history for an increase. All previous changes in the company rate schedule have been downward. The last was a 12.5% reduction in electric power rates in 1947.

Loiseau said in statement "it is with regret we must take this action, as we have been hopeful we could weather the prevailing higher prices without an increase . . . "

He said rising costs were the sole reason for the petition. He reported wages and salaries, which constitute 32% of the company's overhead, have increased 85% in 10 years. He said taxes had increased 40% since 1947.

New Mexico Public Service Seeking Rate Adjustment

Public Service Co. of New Mexico last month energized its $800,000, 115-kv line between Santa Fe and Las Vegas, N. M., to complete integration of its electric facilities in three New Mexico cities.

The integration—authorized several months ago by Public Service Commission of New Mexico—tied in the generating plants at Albuquerque with distribution systems at Las Vegas and Santa Fe. Coupled with the integration is a rate adjustment, also approved by PSC, which will produce about $312,000 additional revenue per year for the utility.

The new schedule will boost rates in Albuquerque (about 50c per month for average residential consumers), reduce bills in Las Vegas and leave those in Santa Fe virtually unchanged.

Under PSC orders the utility had to delay its new rates until the Santa Fe-Las Vegas power line had been completed. Rugged, mountainous country and numerous rocky formations delayed completion of this 57-mile line by about a month. M. C. Heffelman, vice-president in charge of operations, reported that in some cases, three blasting charges had to be used to produce a hole large enough to anchor the H-type pole structures.

The line skirts the southern end of the Sangre de Cristo mountain range—highest in New Mexico. From Santa Fe it runs south to Lamy, then swings northeast to cross U. S. 85 near Rowe and finally goes directly to Las Vegas across rugged terrain near Tecolote Peak.

BPA Rates and Schedules Approved by FPC

Power rates and schedules in Bonneville Power Administration's new long-term contracts with five private utility companies of the Pacific Northwest have been approved by FPC for the period ending Dec. 19. Termination date of the confirmation is tied up with federal agency studies involving rates and possible revision as required by the Bonneville Act. An increase in rates for the Columbia River federal generation is anticipated because of higher costs of projects completed since the last rate review date.

FPC took note of the fact that BPA is unable to supply Portland General Electric, Pacific Power & Light, Mountain States Power, Washington Water Power and Puget Sound Power & Light their full firm purchased power requirements and that quantities delivered each month are determined by a supply schedule prepared each year by BPA.

"The contracts establish a schedule of specific priorities for the allocation of power expected to be available to the various classes of Bonneville's customers during the term of the contracts," FPC declared.

"They must also provide that Bonneville may withdraw from the companies, upon five years' notice, capacity and energy anticipated to be required by public bodies, cooperatives or federal agencies."

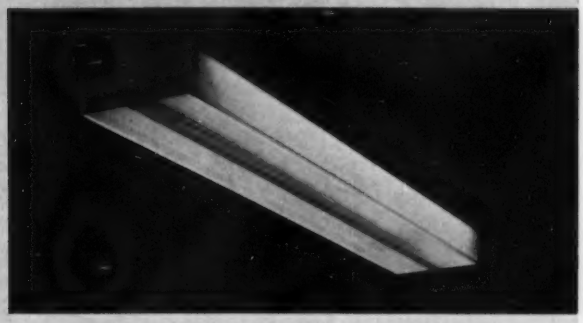
Rates and charges are under BPA's C-4 rate schedule of $17.50 per kilowatt-year, applied on a monthly basis to the allotted demand, with certain modifications to apply when utilization of the allotted demand is restricted.

• **Kittitas County PUD** of Ellensburg, Wash., has received word that it has been approved to receive a $77,500 loan from the REA for construction of a $20,000 substation and expansion of distribution facilities. Approximately 11 miles of line are scheduled for construction during the next two years, said H. A. Fleming, PUD manager.

stripped down to bare luminosity There are no retaining structural members to garble the luminosity of Globe's revolutionary new "Challenger"—an all-plastic luminaire with an overall depth under four inches.

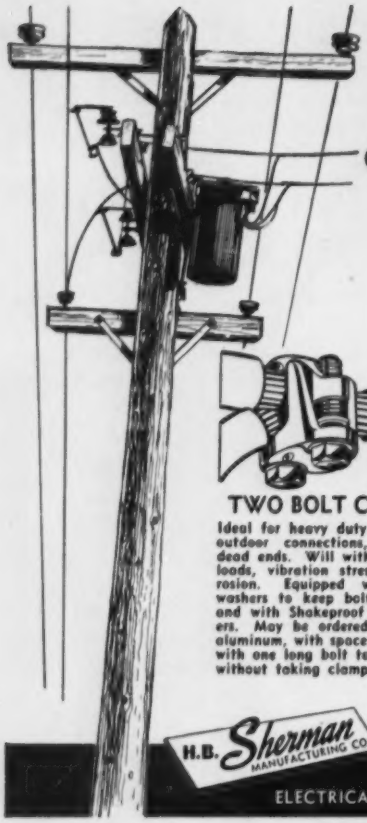
Side panels and bottom are connected by an interlocking system of construction, engineered to prevent bowing or distortion.

The clear plastic, prismatic lens bottom directs light intensity in a straight downward path, tapering sharply at oblique angles. Extruded polystyrene, beaded-edge side panels provide controlled diffusion.



Maintenance is a snap. A slight upward pressure easily disengages the light weight lens bottom. Dust infiltration is reduced to a minimum.

"Challenger" promises to outmode any luminaire of its type. It is one of various lighting advances presented for the first time in Globe's new 1954 catalog. Write for your copy. **Globe Lighting Products Inc.** 2121 South Main Street, Los Angeles 7, California.



USE
Sherman®
Connectors
For
Economical Quality

TWO BOLT CLAMPS
Ideal for heavy duty indoor and outdoor connections, taps and dead ends. Will withstand overloads, vibration stress and corrosion. Equipped with rubber washers to keep bolts in place, and with Shakeproof lock washers. May be ordered plated for aluminum, with spacer washer, or with one long bolt to permit use without taking clamp apart.

JUMPER CLAMPS
Unique construction eliminates need of removing bolt to install. Three styles for aluminum to aluminum, aluminum to copper, and copper to copper.

SPLIT BOLT CONNECTORS
Extra strength and die-cut threads permit re-use. Three styles available in many sizes.

WRITE FOR CATALOG

H.B. Sherman MANUFACTURING CO.
BATTLE CREEK, MICHIGAN
ELECTRICAL FITTINGS FOR WIRE AND CABLE

MICA?

—Whatever you want, we have it!

- **Y-26 HIGH HEAT MICA PLATE** Composite bonded, for heater appliances. Sheets or stampings.
- **SUPER-NEMCOITE** Composite bonded for equipment or machinery. Flexible or rigid sheet, tubing, or combined with Fiberglas.
- **MICA COMMUTATOR INSULATION** Rings, Segments, Sleeves to specifications.
- **MICA MOLDING PLATE** *(Thermoplastic)* Sheets, stampings or molded forms.
- **MICA SEGMENT PLATE** *(Thermoset)* Sheets, stampings or molded forms.
- **FLEXIBLE MICA PLATE** *(Cold Forming)* Sheets, or combined with Fiberglas, paper, cloth.
- **MICA TUBING** Any diameter and wall thickness, or sleeves and bushings.
- **MICA TAPE** Any thickness or width, combined with paper, silk, rayon, cellophane, Fiberglas.

Your Complete Source for Mica!

NEW ENGLAND MICA
Waltham, Mass.

Standard Forms in Stock Ready To Ship From

INSULATION and WIRES
INCORPORATED

LOS ANGELES 2240 E. Washington Blvd.
SAN FRANCISCO 1077 Howard St.
PORTLAND, ORE. 1702 N. E. Sandy Blvd.
ST. LOUIS
And 12 other cities

Bringing you . . .

The MOST NEEDED DATA for ALL fields of Electrical Engineering

This great standard reference work for all in the electrical engineering profession and all whose work touches on this field brings a handy compilation of practical, usable data from all fields of electrical engineering practice, plus the most frequently required fundamental theory, units, and systems of measurement, made dependable by the work of 101 engineers, scientists, and other authorities.

STANDARD HANDBOOK for ELECTRICAL ENGINEERS

By Archer E. Knowlton, Editor-in-Chief, *Senior Associate Editor, Electrical World* and R. M. Shoop, Assistant Editor, *Assistant Editor, Electrical World*

Eighth Edition, 2311 pp., 6 x 9
1961 illus., 600 tables, $17.00
(payable in monthly installments)

26 big sections cover wide range—from electricity in aviation and air conditioning to power transmission, illumination, electronics, and scores of other fields—plus giving data on recent developments in magnetic materials, insulations, radar, servo-mechanisms, induction, dielectric heating, etc.

SEE THIS BOOK 10 DAYS FREE

McGraw-Hill Book Co., 330 W. 42nd St., NYC 36
Send me Knowlton's STANDARD HANDBOOK FOR ELECTRICAL ENGINEERS for 10 days examination on approval. In 10 days I will send $5.00 plus few cents delivery and $3.00 monthly until $17.00 price is paid, or return book postpaid. (We pay for delivery if you remit first payment with this coupon; same return privilege.)

PRINT
Name.....
Address.....
City.....Zone.....State.....
Company.....
Position.....4/54 F West

This offer applies to U. S. only

BONNEVILLE MANAGEMENT PRACTICES STUDIED

Bonneville Power Administration management practices are being screened and appraised by a team from industry and government.

Chairman is J. L. Jennings, a vice-president of Iron Fireman Corp., Portland. Members are Otto Eckert, general manager of the board of the Lansing, Mich., Water & Light Commission; Carl Forsberg, executive vice-president, Wisconsin Power & Light Co., Madison, Wis.; John G. Marr, director of the Interior Department's technical review staff; George Goodrik of Interior's division of management research.

Interior Secretary McKay reported that the team had made a preliminary study in Washington and would continue its work in Portland and in BPA's area and district offices.

IBEW Starts Drive to Get Unified Welfare Plan

While negotiating wage increases of 2% for 1954, Local 77 of the International Brotherhood of Electrical Workers, AFL, at Seattle has scheduled a long-range drive to bring its 6,600 members in Washington and northern Idaho under a unified welfare program.

First 1954 contract with a PUD was negotiated with the Cowlitz County PUD at a 2% wage increase for all employees. The increase, retroactive to Jan. 1, will give journeymen linemen $2.70 an hour. Some 165 office and production workers are involved.

All 46 units of the union in the two states will seek to promote the welfare program, their representatives agreed at a Seattle meeting. The union wants employers to pay the estimated 10c an hour the program would cost.

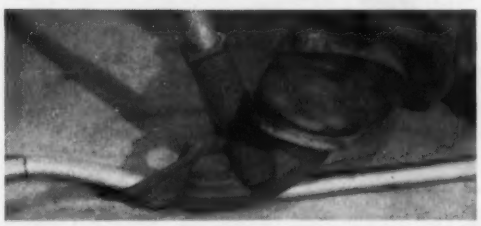
• **Decline** of the cost-of-living index for the Portland, Ore.-Vancouver, Wash., area between October 1953 and March revision dates of The Clark County PUD cost-of-living allowance agreement with workers has brought a drop in the PUD's pay roll. Commissioners ordered the cut, as of March 1, and reported it would mean about $2.50 less per month for office workers and engineers and 2c an hour less for electrical workers.

• **City Light linemen** at Ellensburg, Wash., have been granted a 4% wage increase to $2.70 an hour, retroactive to Jan. 1. They were represented by the Electrical Workers Union, which now is bargaining with five PUD's, employing 800 members of the union.

Here's how YOU benefit from Republic "Inch-Marking"

HERE'S ACCURACY. "Inch-Marking" is an exclusive Republic feature on the ½", ¾" and 1" sizes. "Inch-Marks" are first lined up with the markings on the Republic Bender. Then, when The Bending System is followed, journeymen can make smooth, accurate saddle bends, stubs, back-to-back bends and true offsets.

HERE'S CONVENIENCE. With "Inch-Marked®" Republic E.M.T., you measure the distance. No time wasted trying to hold a flat rule on a round tube. And the marks are right on the button. All you do is cut. A 32-tooth hacksaw blade is recommended.



HERE'S EASY BENDING. The Republic Calibrated Bender can be used in upright position or on the floor. And ductile Republic E.M.T. bends smoothly because it is made of quality-controlled Republic Steel.

HERE'S GALVANIZING THAT HOLDS. The galvanized finish on Republic E.M.T. won't chip, peel or flake off. Each length is thoroughly cleaned before galvanizing. Lengths can be cut anywhere without disturbing the finish. Coating withstands 4-Dip Preece Test, as covered by Underwriters' Laboratories Inspection; also meets American Standard Specification C80.3 and Federal Specification WW-T-806.

HERE'S EASY WIRE-PULLING. Inside-Knurling, an exclusive Republic feature, makes it up to 30 per cent easier. Less strain, less time needed to do the job. And only Republic E.M.T. has it. Write for Booklet SA-54.

REPUBLIC STEEL CORPORATION
Steel and Tubes Division
257 East 131st Street, Cleveland 8, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N.Y.

REPUBLIC STEEL
REPUBLIC ELECTRUNITE E.M.T.
"INCH-MARKED" The Mark of Quality

IN THE FIELD as in laboratory tests . . . ***Crapo*** Galvanized Steel Strand proves itself capable of withstanding severe punishment. Steel's inherent strength and durability are combined with definite economies in every size and grade of ***Crapo*** Steel Strand. You'll find the heavy, ductile, tightly-bonded zinc coatings, applied by the famous ***Crapo*** Galvanizing Process, provide lasting protection against corrosion.

Contact your jobber of *Crapo* Galvanized Products or write direct for further information!

INDIANA
STEEL & WIRE COMPANY
MUNCIE, INDIANA

EXTRA Holding Power
QUICKLY Installed
TOUGH For long life

EVERSTICK ANCHORS

For new construction and maintenance —Everstick Anchors speed up work and provide dependable anchorage on all types of jobs. Made of resilient, rust resistant malleable iron. The toughest anchors made. Write for bulletin.

EVERSTICK ANCHOR CO.
FAIRFIELD, IOWA

NOTES ON THE TRADE

• **Major changes** in the U. S. Steel's Columbia-Geneva Steel Division were announced recently by Alden G. Roach, division president. **Loren J. Westhaver** was named general manager of operations, with headquarters in San Francisco. This is a new executive position in the operating department headed L. S. Dahl, vice-president. Westhaver had been vice-president and manager of Utah operations for the division since November 1951. Previously he had held the same position with the former Geneva Steel Co. and Columbia Iron Mining Co. **J. D. McCall,** former general superintendent of the Pittsburg, Calif., works was named to the newly created position of assistant general manager of operations. He was succeeded at Pittsburgh by **Donald E. Rice,** who had been general superintendent at the Torrance, Calif., works. **C. C. Morgan** was appointed to the Torrance superintendent's post and **R. B. Freeman** to the Pittsburg post.

• **Plans** to manufacture power factor correction capacitors have been announced by Sangamo Electric Co. of Springfield, Ill. Although known in the electric utility field primarily as manufacturers of watt-hour meters, the company has been in the electronics capacitor business for the past 30 years and owns and operates a capacitor plant in Marion, Ill. It was pointed out by C. H. Lanphier, executive vice-president, that supplying equipment for the control of power factor capacitors had given the company a good insight in the application problems of its utility customers.

• **Okonite** Co. of Passaic, N. J., manufacturer of insulated wires and cables, has announced that, effective April 1, the Okonite-Callender Cable Co. Inc., its wholly owned subsidiary, will be merged with the parent company.

• **Roller-Smith** Corp. of Bethlehem, Pa., manufacturer of electrical equipment for 50 years, has been purchased by the Mailman interests.

• **Line Material** Co. has completed a 16-mm color film, *The Story of the Round-Wound Transformer.* It runs 22 minutes; is available to technical audiences upon request to the company's Advertising Department, Milwaukee 1, Wis.

Ryman

• **E. G. Ryman** has been made Western regional sales manager of the A. B. Chance Co., with offices at 815 Tennessee St., San Francisco. He had been Chance district manager in Portland for seven years. The Western region, one of five recently established by the company, includes Arizona, California, Colorado, Idaho, Nevada, Oregon, Utah, Washington, Wyoming and parts of Montana, Nebraska, New Mexico and Texas. Chance sales representatives in the region are **Fred F. Baldwin,** Seattle, **J. L. Hanks,** Portland, **C. E. Malloy,** San Francisco, **M. R. Parkin,** Salt Lake City, **J. R. Rice,** Los Angeles.

• **For outstanding performance against budget,** the Northwest district of the Construction Materials Division, General Electric Co., won an excursion to Sun Valley, March 3-5. This included the representatives in Washington, Oregon, Utah, Idaho and Montana. A meeting was held there, at which C. C. Walker, vice-president and general manager, Construction Materials Division, J. J. Lengyel, manager of marketing, and Joe S. Overstreet, manager of marketing for the wire and cable department, brought home-office information and ideas. During the three-day program of meetings and fun, W. W. Bryan, district manager, Seattle, L. B. Johnson, Salt Lake City district representative, Lloyd Shackelford, Seattle wire and cable specialist, also participated in the discussions. Others attending were Floyd Good, Portland representative, and W. D. Hattenburg, Seattle district representative. Wives were included in the outing. Walker, Lengyel and Overstreet came from Bridgeport for the occasion.

• **Line Material** Co. has announced a new name — Perma-Line — for its bituminous fiber conduit.

Convert Your FORD TRUCK with a Tel-E-Lect DERRICK-DIGGER KIT

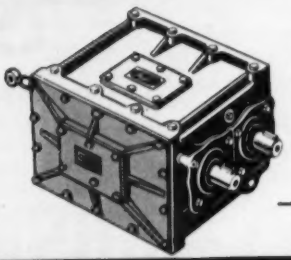
Now there's a Tel-E-Lect Derrick and Digger mounting assembly tailored for the front end of your Ford truck. Cab-controlled, it will handle poles up to 40′ long, requires only two men to handle and can easily be attached to your Ford by your local mechanic. Digs holes and sets poles, with interchangeable auger sizes from 8″ to 20″. *Send for bulletin describing all three models to suit your job requirements.*

Makes It Easy For TWO MEN To Solve Tough Pole Line Problems

Distributed by:
AM. EQUIPMENT & BODY CO., Los Angeles 33
SCHETKY EQUIPMENT CORP., Portland 14
UTILITY BODY CO., Oakland 7

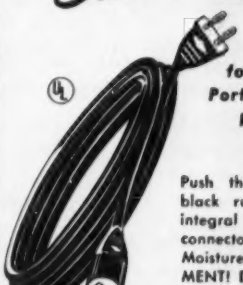
Forward and Reverse Transmission

This unit is included in all Ford conversion kits. Enables the operator instantly to raise or lower either the winch line or derrick. Gives instant forward or reverse rotation to the winch without shifting PTO, and without using the truck clutch.



Tel-E-Lect PRODUCTS, INC.
10025 Minnetonka Boulevard
Minneapolis 16, Minnesota

BE Sure with CORNISH heavy duty extension cord sets



for Lawn Mowers, Hedge Trimmers, Portable Tools, Washing Machines, Refrigerators, Fans, Business Machines, Small Motors

CAT.	LENGTH	CORD TYPE
3543	15 ft.	16/2 16/30SJ
3544	25 ft.	16/2 16/30SJ
3545	50 ft.	16/2 16/30SJ
3546	75 ft.	16/2 26/30SJ
3547	90 ft.	16/2 26/30SJ
3548	100 ft.	16/2 26/30SJ

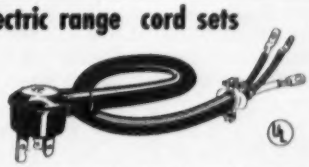
Individually cartoned—Packed 20 to Standard Shipping Package

Push these rugged service units! Husky black rubber cords in standard lengths; integral molded-on components. Female connector has double contact blades, insuring perfect connection. Moisture-proof . . . strain-proof . . . Real GLUTTONS for PUNISHMENT! Data sheets on request.

industrial extension cord sets

ALL-RUBBER components built to withstand crushing loads and impacts. Integral molded-on male and female components, waterproof and strain-resistant. Unequalled as power extension units in factories, shipyards and plants requiring 2-wire service. 25-, 50- and 100-ft. lengths; 16/2, 14/2 and 12/2, type S cord. Data sheets on request.

electric range cord sets



3-, 4-, 5- and 6-ft., type SR rubber covered range cable. Two #6 and one #8 conductors for 50 amp., or two #8 and one #10 conductors for 35 amp. service. CORNISH #500 molded-on plug vulcanized to cable for long-time water-repellent security. Equipped with suitable terminals and metal strain relief. Each cord individually boxed.

Data sheets on request

Support your local Adequate Wiring Bureau program

CORNISH WIRE COMPANY, INC.
50 Church Street New York 7, N. Y.

NEWS ABOUT PEOPLE

• **The Washington State Power Commission** has appointed **L. E. Hall,** Army Engineers, and **John C. Wiebusch,** Bonneville Power Administration, as its engineers. J. Frank Ward, manager director of the commission, announced the appointments.

• **John D. Scott,** who retired from Portland General Electric where he was an industrial engineer, has been named a special representative for the Milwaukee Machinery Co., industrial equipment sales and service firm which recently opened a specially designed plant in Portland.

• **Elmer A. Jacob,** superintendent of utilities for the city of Provo, Utah, retired last month and was succeeded by **Sharp Gillespie.** Jacobs supervised the construction of the Provo city steam plant and was made superintendent in 1945. Gillespie has been with the Provo utility since 1941.

• **San Diego Gas & Electric Co.** has appointed **Edwin R. Prout** station chief and **Joseph L. Kalinas** assistant station chief of its Encina station. **Kenneth Campbell** has succeeded Prout as station chief at Silver Gate and **Jon P. Hardway** has taken Kalinas' post as assistant station chief there.

• **W. W. Pickrell,** president of the Salt River Valley Power District for four years, has notified directors he will not seek re-election in the spring. **Vic Corbell,** project vice-president, has agreed to run for the presidency. **Bert Pringle,** governor, will run for vice-president.

• **Appointment of Lawrence C. Sheaffer** as North Pacific district welding application engineer has been announced by Westinghouse. He will be located at the company's Seattle headquarters at 3451 E. Marginal Way.

• **J. F. Gray** has been acting chief electrical inspector for the city of Portland since the retirement last November of **L. W. Going,** chief electrical inspector.

• **Otis E. Keeler** has retired after 40 years with Westinghouse. He was switchgear product engineer in San Francisco.

Lawrence M. Robertson, chief electrical engineer for Public Service Co. of Colorado, who was given the Gold Medal Award for distinguished engineering service by the Colorado Engineering Council. The award, sixth voted by the council in 35 years, cited Robertson as "an engineer of great stature, capable and eager to serve his profession, his country and his fellow man"

• **Harold Harmony** has been named assistant superintendent at Burlington for Puget Sound Power & Light Co. He was transferred from a similar position in Puget's southern division at Olympia. He takes charge of construction, operation and maintenance of the northern division's distribution system in Skagit and Island Counties.

• **R. H. Lloyd** has been named district appliances sales manager for Graybar's Northwestern district, with headquarters in Seattle. He succeeds **N. A. Hayes,** retired. The territory includes Oregon, Washington, Idaho, Montana and Alaska.

DEATHS

• **John A. Clay,** 76, one of the pioneers in the industry with the Western Colorado Power Co. and later assistant engineer, Utah Power & Light Co., retired 1945, died Feb. 25 at Pasadena, Calif. In 1948 he was a member of the Korean power mission of the U. S. Army to rehabilitate Korea's electrical systems. He joined Western Colorado Power at Durango in 1910; was elected a vice-president and served as general manager until 1936, when he transferred to Utah Power & Light.

• **Prince Andre Poniatowski,** one of the original financiers of the Standard Electric Co., now part of Pacific Gas and Electric Co. in San Francisco, at the turn of the century, died near Toulouse, France, aged 90, in mid-March. He was descended from the last king of Poland.

• **Harry Hilpert,** former business manager of Local 46, IBEW, in Seattle and active in Electric Club of Washington affairs, later state electrical inspector in the Seattle area, died Feb. 12.

• **Everett M. Breed,** 73, retired engineer and former president of the Pelton Water Wheel Co., San Francisco, died recently at La Jolla, Calif. He was associated with the Pelton Water Wheel Co. from 1915 until his retirement in 1942.

• **Daniel Boone,** 48, assistant general manager in charge of financing, business and sales of the Salt River Power District, died March 15 at Phoenix. He had been in ill health for some time.

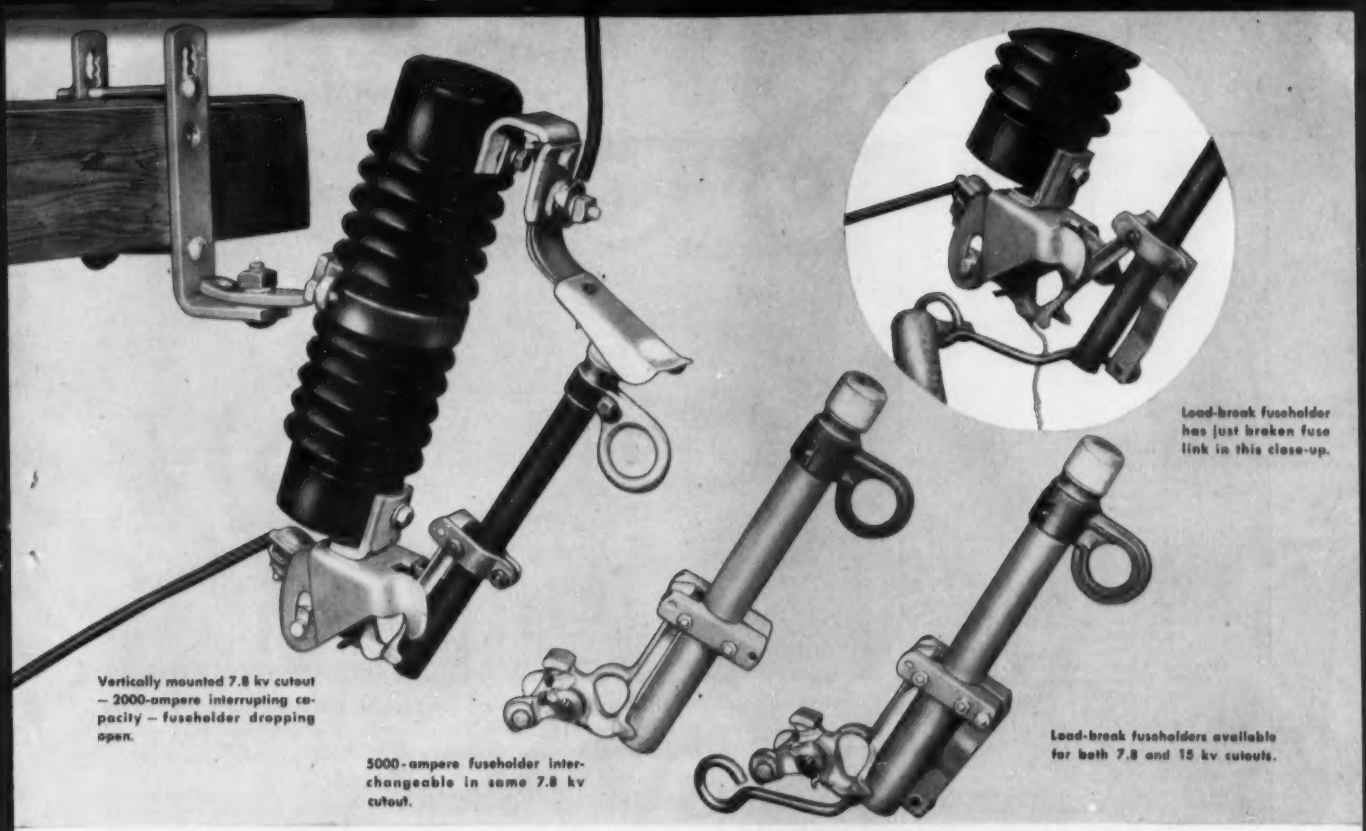
• **Martin L. Sloan,** 66, former vice-president and general manager of General Electric Co.'s Lamp Division, died recently at Los Altos, Calif. He retired Dec. 31, 1949 under the company's pension program, after nearly 40 years of service.

• **Rudolph Warner Van Norden,** 78, consulting engineer, died March 9 in San Francisco, his home. An expert on arched and multiple-arched dams, he is credited with designing some 50 dams and 30 hydro plants. He was technical adviser on Hoover Dam. From 1897 to 1905 he served as chief engineer and general superintendent of Central California Electric Co. at Sacramento and, after its merger with Pacific Gas and Electric Co., he became PG and E's Sacramento division superintendent. One of that company's oldest power houses still in operation, Alta, built in 1902 near Auburn, was designed by Mr. Van Norden. Consultant on numerous major projects, he worked for the USBR in 1929.

• **William Henry McGrath,** 74, who retired in 1931 as executive vice-president of Puget Sound Power & Light Co., died in Seattle on March 3. He had remained active as a director of the power company and other firms. He had been in Seattle since 1913.

• **Reno E. Thatcher,** retired superintendent of Puget Sound Power & Light Co.'s service department, died recently in San Diego, where he had moved after 36 years in Seattle.

• **Oscar L. Mackell,** 73, retired from Public Service Co. of Colorado, died March 18 at his Denver home. He retired May 1, 1951 after heading the customer department for 29 years. He was a member of the board of directors from 1939 to 1943.



Vertically mounted 7.8 kv cutout – 2000-ampere interrupting capacity – fuseholder dropping open.

5000-ampere fuseholder interchangeable in same 7.8 kv cutout.

Load-break fuseholder has just broken fuse link in this close-up.

Load-break fuseholders available for both 7.8 and 15 kv cutouts.

NEW G-E OPEN DROPOUT CUTOUT

For FAULT PROTECTION—standard or heavy duty and LOAD BREAK—up to full load at any power-factor.

New simplified design of General Electric 7.8 kv and 15 kv, 100-ampere cutouts have these extra features:

Birdproof Construction accomplished by unique method of clamping the mounting support to the opposite side of insulator from live parts.

Liberal electrical and mechanical strength. New hollow tube wet process porcelain has under-cut petticoats for generous creep and strike distance; and porcelain insert fired within tube provides inside solid barrier between top and bottom live parts. Screen prevents insect nest within porcelain. Clamping U-bolt around porcelain is insulated with molded polyvinyl chloride having excellent insulating and weathering characteristics.

Compression bolting to porcelain—top and bottom fittings are bolted to insulator with porcelain under compression—for maximum mechanical strength. Compression clamps inside the porcelain maintain tight assembly.

Shielded top contact and latch—by roof-shaped contour and having ball-point contact surface to top of fuseholder, the top contact and its latch are protected from dirt deposits and sleet.

Other distinctive features are retained: Hinge guides allow slamming fuseholder from any angle; threaded cap seal at upper end of fuseholder forces expulsion gases downward; silver-plated contacts shielded from corrosive agents; vertical or angle-tilted swivel mounting with EEI-NEMA bracket; latch provides time-delay opening—assures fault current interruption before dropout action occurs; fuseholder tube of fiber and fabric-base Textolite* is water resistant, will not warp or split; close coupling of fuseholder to porcelain prevents multiplication of recoil forces.

For more information on these new open cutouts, contact your nearest G-E Sales Representative, or write to General Electric Company, Section 433-4, Schenectady 5, New York.

*Reg. trade-mark of General Electric Company

Progress is our most important product

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

INDEX TO ADVERTISERS
April 1954

Allis-Chalmers Mfg. Company 13, 24, 25, 40, 41, 73
American Steel & Wire Div. 134, 135
American Tel. & Tel. Co. 18
Anaconda Wire & Cable Co. 126, 127

Benjamin Electric Mfg. Company 8
Blackburn Products Corp., Jasper 47
Brower-Titchener Corp. 20, 21
Briegel Method Tool Company 67
BullDog Electric Products Co. 61

Chance Company, A. B. 35, 145
Cole Electric Company 158
Condon, Earl S. 152
Copperweld Steel Company 157
Cornish Wire Company 153
Corrin, J. G. 146
Crouse-Hinds Company 133

Davey Tree Surgery 144
Day-Brite Lighting, Inc. 121
Driver-Harris Company 49

Electrical Fittings Corp. 56
Everstick Anchor Co. 152

Fisher-Pierce Company 32

G&W Electric Specialty Company 43
Gadney Electric Company 29
General Electric Company:
Cleveland, Lamp Division 65
Plainville, Distribution Assemblies Div. 139
Schenectady, Apparatus Div. 4, 5, 36, 37, 54, 55, 74, 155
Globe Lighting Products, Inc. 149
Graybar Electric Co., Inc. 42

Havi Duty Electric Company 60
Holophane Co., Inc. 34
Hann, George E. 146
Hotpoint Company, Div., G. E. Co. 125

Indiana Steel & Wire 152

Johns-Manville 38

Kaiser Engineers 128
Kearney Corp., James R. 130, 131
Kerite Company 19
Klein & Sons, Mathias 70
KPF Electric Company 137
Kuhlman Electric Company 22

Line Material Company 3, 16, 17
Locke Dept., General Electric Co. 44, 45

McGraw-Hill Book Company 150
Minnesota Mining & Mfg. Co. 23
Maloney Electric Company 31

New England Mica Co. 150

Ohio Carbon Company 52
Orangeburg Mfg. Co., Inc. 28
OZ Electrical Mfg. Co., Inc. 30

Pacific Car & Foundry Company 26
Pacific Coast Borax Company 132
Pacific Coast Elec'l Association ..... 4th Cover
Pacific Electric Mfg. Corp. 27
Pacific Gas and Electric Co. ..... 3rd Cover
Penn-Union Electric Corp. 39
Peterson Engineering Company 136
Phelps-Dodge Copper Products Corp. 58, 59
Porcelain Products, Inc. 140
Preformed Line Products Company 122, 123

Republic Steel Corp. 151
RLM Standards Institute 57
Rome Cable Corp. 10, 11

Sangamo Electric Company 62, 63
Shell Oil Company 15
Sherman Mfg. Co., H. B. 150
Simplex Wire & Cable Co. 129
Slater Electric & Mfg. Co., Inc. 144
Smoot-Holman Company 1
Soapstone Duct Company 71
Southern California Edison Company ..... 2nd Cover
Spang-Chalfant Div. Nat'l Supply Company 143
Sperti-Faraday Company 136
Square D Company 6
Standard Oil Company 53
States Company 66
Steel City Electric Company 9
Steel & Tubes Div., Republic Steel Corp. 151
Sunbeam Lighting Company 12
Sylvania Electric Products, Inc. 147

Tel-E-Lect Products, Inc. 153
Triangle Conduit & Cable Co. 68, 69
Tri-State Supply Corp. 148

United States Rubber Company 33
United States Steel Corp. 134, 135

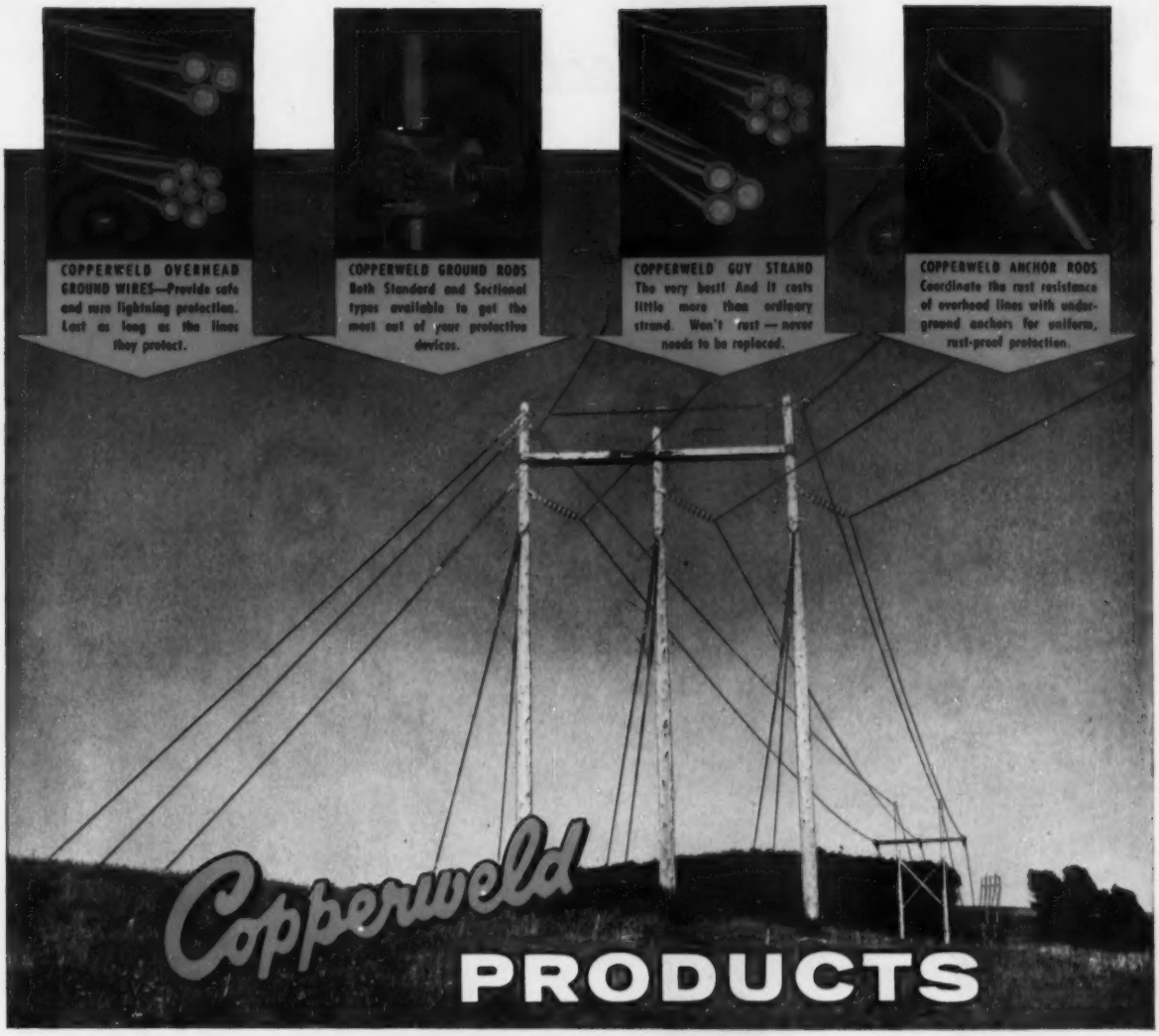
Wagner Electric Corp. 50, 51
Western Insulated Wire Company 64
Westinghouse Electric Corp. 7
Wiremold Company 146
Youngstown Sheet & Tube Company 14

PROFILES

Loren J. Westhaver, left, was named general manager of operations for U. S. Steel's Columbia-Geneva Steel Division and J. D. McCall, right, was made assistant general manager in recent major changes in the division. (See story on page 152.)

Sun Valley outing-meeting was the reward won by these G-E construction materials division men from the northwest district: F. D. Good, Portland; W. W. Bryan, Seattle; L. B. Johnson, Salt Lake City; W. D. Hattenburg, Seattle (right); meeting with C. C. Walker, G-E vice-president; J. J. Lengyel and J. S. Overstreet, marketing managers who came from Bridgeport for the occasion. (See story on page 153.)

Pioneers of the motor shops were honored at NISA dinner in San Francisco. At head table: R. H. Conrad, Oakland; Lloyd Flatland, representing Martin Flatland; Fred Buzzell; William Hogue, NISA president; Keith Noble, chapter president; Frank Boyd; Arthur E. Rowe; Jack Van Alstyne, representing his father, Sacramento. Certificates were presented by Hogue. (Details of this meeting are on page 119.)


COPPERWELD OVERHEAD GROUND WIRES—Provide safe and sure lightning protection. Last as long as the lines they protect.
COPPERWELD GROUND RODS Both Standard and Sectional types available to get the most out of your protective devices.
COPPERWELD GUY STRAND The very best! And it costs little more than ordinary strand. Won't rust — never needs to be replaced.
COPPERWELD ANCHOR RODS Coordinate the rust resistance of overhead lines with underground anchors for uniform, rust-proof protection.
Copperweld
PRODUCTS

For GROUNDING and GUYING

UNEQUALED in performance! UNRIVALED in long life! UNSURPASSED in economy!

Good engineering goes hand in hand with the best materials, especially for grounding and guying. That's why so many power systems, railroads and communication companies buy Copperweld* Products. There is no better way to keep overhead down and to be assured of constant, uninterrupted service. Use Copperweld Products on all your installations—it pays!

*Trade Mark

COPPERWELD STEEL COMPANY
WIRE AND CABLE DIVISION Glassport, Pa.

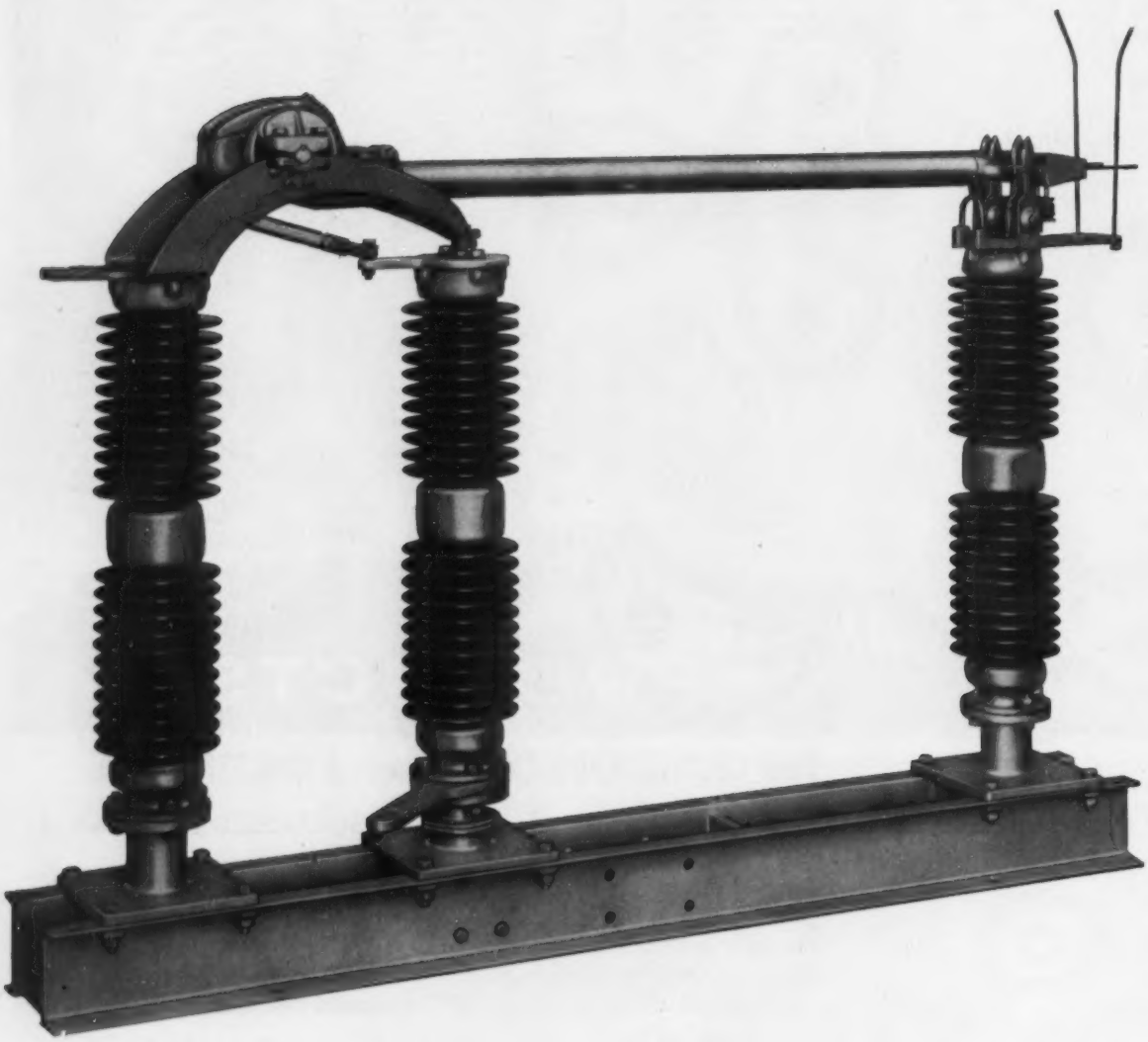
SALES OFFICES IN PRINCIPAL CITIES
For Export: Copperweld Steel International Company, New York

Good Engineering Demands The Best Materials... Copperweld PRODUCTS

Combine the strength of steel with the conductivity and permanence of copper.

Cole Electric Co.

8439 Steller Drive TExas 0-4701 Culver City, Calif.



AIR BREAK DISCONNECTING SWITCH
69,000 Volts—1200 Amperes
Type 0-2
Vertical Break, Three Pole, Single Throw
Group Operated—One Pole Shown
HIGH PRESSURE SILVER TO SILVER CONTACTS
See Bulletin 46-A

How air conditioning helps cut absenteeism

Surveys show air conditioning helps prevent colds and many other illnesses that cause employee absences. It gives you an endless supply of fresh, clean air . . . free from dust, dirt, and excessive humidity. And it maintains a floor-to-ceiling climate so pleasant and uniform that employees enjoy coming to work.

Why not look into the advantages of year-round air conditioning today? Chances are, its benefits to your business—measured in dollars and cents alone—will more than repay every penny you invest. There are many types and makes to choose from . . . gas or electric units for heating or cooling . . . electric heat pumps that do both jobs. And with P. G. and E.'s low rates, the one you pick is cheap to operate.

P·G·and·E·
PACIFIC GAS AND ELECTRIC COMPANY

For air conditioning advice, contact your consulting engineer, contractor, or local P. G. and E. office.

402-X-154

Make your plans now—*to be*

"Side by Side—for Electrical Progress!"

at the P. C. E. A. Annual Convention, May 19-20-21

Hotel del Coronado, San Diego, California

A wonderful place to be...

A great bunch to be with...

A fine full program...

Clear the dates—and the decks—for the biggest and best convention yet, coinciding with the celebration of "Light's Diamond Jubilee." The program will be packed with exciting, enjoyable events you won't want to miss. Details are on the way—watch for them!

Pacific Coast Electrical Association

530 West Sixth Street, Los Angeles, 14, California
681 Market Street, San Francisco 5, California